

## INFORMATION REPORT INFORMATION REPORT

## CENTRAL INTELLIGENCE AGENCY

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S-E-C-R-E-T

25X1

COUNTRY	Poland	REPORT	
SUBJECT	Polish	DATE DISTR.	23 July 1959
		NO. PAGES	1
	<i>industrial</i>	REFERENCES	RD
	<i>machinery</i>		
DATE OF INFO.			
PLACE & DATE ACQ			

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SOURCE EVALUATIONS ARE DEFINITIVE. APPRAISAL OF CONTENT IS TENTATIVE.

1. The following is a list of industrial machinery

25X1

- a. Single Column Vertical Boring and Turning Mill KNA/110
- b. Copying Lathe TGA-13 (sic)
- c. Automatic Lathe ATL-40 (brochure not received)
- d. High-Speed Lathe TR-70 / 200
- e. Milling Machine (High-Speed horizontal) 4FXA
- f. Radial Drilling Machine WR50/2,0
- g. Surface Grinder SPB-30
- h. Tread Roller WGH-80
- i. Universal Milling Machine FWB-25
- j. Production High-Speed Turning Lathe TPC-24

2. Brochures describing the machines are attached to this report and are forwarded for your retention. When detached, the brochures may be handled as unclassified material.

25X1

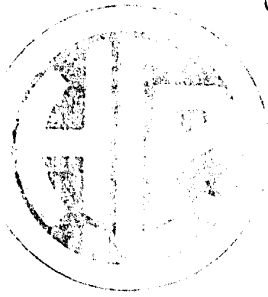
S-E-C-R-E-T

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STATE	ARMY	NAVY	AIR	FBI	AEC					
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(Note: Washington distribution indicated by "X"; Field distribution by "#".)

## INFORMATION REPORT INFORMATION REPORT

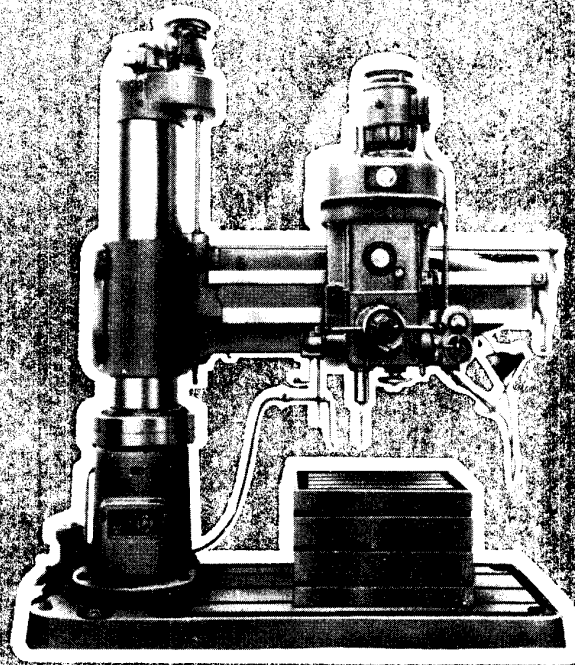


ZAKŁADY PRZEMYSŁU METALOWEGO

POLSKA

FOUNDATION YEAR 1846

POLAND



TYPE

WT 50/1,6

**RADIAL DRILLING  
MACHINE**

## ZAKŁADY PRZEMYSŁU METALOWEGO

FUNDATION YEAR 1846

POLSKA

POLAND

## RADIAL DRILLING MACHINES — TYPE Wr 50/1,6 and Wr 50/2

Radial drilling machines, type Wr 50/1,6 and Wr 50/2 are designed for drilling and working holes. They are specially fitted for drilling holes in heavy objects on various levels in the radial vertical traverse of the arm without the need of moving the worked object.

Besides drilling the following operations can be carried out on the machine: caliber — boring, tapping, reaming of holes, facing of small faces. With special equipment the drilling machine can be used for turning and light milling.

A normal table or a tilting table is provided for setting and clamping small objects. Bigger objects are set directly on the baseplate.

	Type Wr 50/1,6	Type Wr 50/2
Maximum drilling diameter in steel, strenght 60 kg/mm <sup>2</sup>	mm 55	mm 55
Maximum drilling dia. in cast iron, strenght 22 kg/mm <sup>2</sup>	mm 70	mm 70
Maximum (minimum) drilling radius	mm 1610/610	mm 2160/650
Maximum (minimum) distance from the spindle face to the top of the base plate	mm 1410/460	mm 1800/670
Greatest vertical arm movement	mm 600	mm 780
Greatest vertical spindle movement	mm 350	mm 350
Morse cone of spindle	No 5	No 5
Swivel of arm round the column	360°	360°
Dimensions of the baseplate	mm 2420×955	mm 3050×1050
Height of the machine by the top position of the arm	mm 3300	mm 3700
Spindle speeds:		
rates	36	36
range of speeds	r.p.m. 30÷1700	r.p.m. 30÷1700
Spindle feeds:		
rates	18	18
range of feeds	r.p.m. 0,03÷1,20	r.p.m. 0,03÷1,20
Spindle drive motor:		
power	kW 4,5	kW 4,5
speed	r.p.m. 1440	r.p.m. 1440
voltage	V 220/380	V 220/380
Arm elevating motor:		
power	kW 1,7	kW 2,8
speed	r.p.m. 1420	r.p.m. 1420
voltage	V 220/380	V 220/380
Clamping device motor:		
power	kW 0,37	kW 0,37
speed	r.p.m. 1390	r.p.m. 1390
voltage	V 220/380	V 220/380
Cooling pump motor:		
power	kW 0,08	kW 0,08
speed	r.p.m. 2880	r.p.m. 2880
voltage	V 220/380	V 220/380
Net weight without table	kG 4100	kG 6000

The drilling head has a rigid box design and moves along the arm. The top guideway has a steel band lining, that protects it against wear and secures an exact guiding of the drilling head. The drilling head is provided with mechanisms for rapidly elevating and lowering the spindle, for power and hand feeding of the spindle, for adjusting the depth of drilling, for controlling the spindle speeds



# ZAKŁADY PRZEMYSŁU METALOWEGO

POLSKA FOUNDATION YEAR 1846 POLAND

Producers of:

Tool machines for metals —

Turret lathes  
Automatic lathes  
Semi-automatic lathes  
Radial drilling machines  
Universal milling machines  
Circular saws.

Ship engines —

Steam engines  
Combustion engines  
with compression ignition

Rolling stock —

Locomotives for goods-train  
Passenger waggons  
Sleeping cars  
Luggage waggons.

Roller bearings —

Special roller bearings  
for tool machines spindles.

Stampings —

Heaters, pots and  
spinning bobbins, canisters,  
steel bottles for gas etc.

Tools —

Cutting tools for metal  
and wood working,  
Measuring tools.

SOLE EXPORTERS:

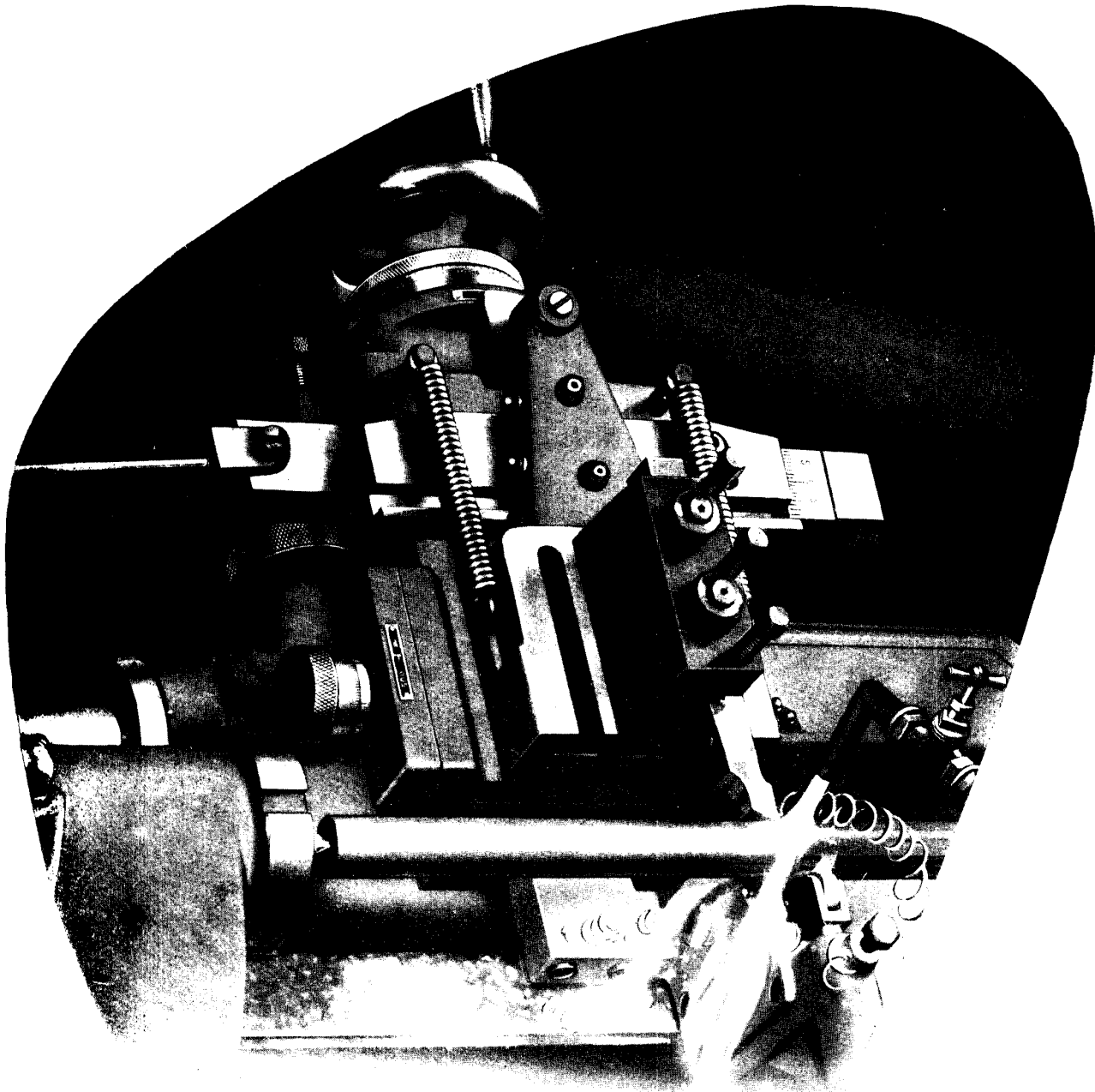


## METALEXPORT

NATIONAL ENTERPRISE

WARSZAWA, MOKOTOWSKA 49  
SKRZYŃKA POCZT. 442, TELEPHONES: 8-22-91, 8-44-41  
TELEGRAMS: METALEX — WARSZAWA.

10  
**High efficiency!**  
**Highest possible precision!**  
**Semi-automatic work cycle!**

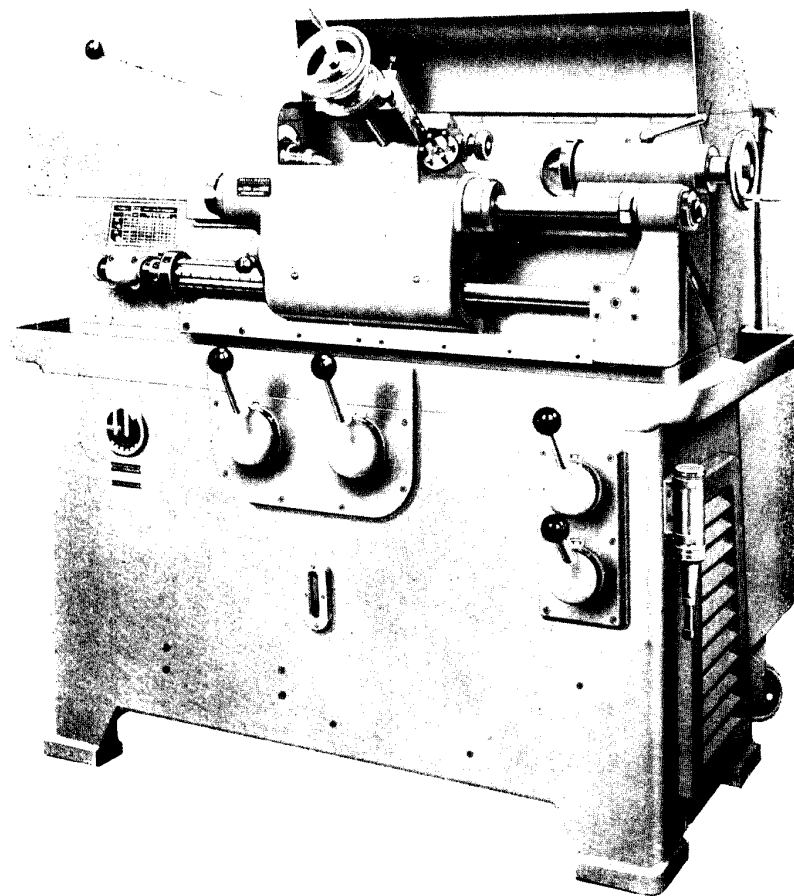


**Production High-speed Turning Lathe TPC-24**

**METALEXPORT**



**WARSZAWA**



## Production High-speed Turning Lathe TPC-24

**THE TPC 24** production high-speed turning lathe belongs to the light type of machines, provided with a hydraulically driven saddle and designed for machining both steel and light-metal shafts. The remarkably rigid construction of the machine allows for obtaining very high roughing speeds, while finishing is performed with exceptional accuracy. These results are obtained also when materials of a tensile strength exceeding 100 kg. sq. mm. (63.5 t./sq. in.) are machined. Turning can be carried out either with high-speed steel, or carbide tipped tools. The carefully chosen equipment of the machine, as well as infinitely variable hydraulic feeds provide the possibility of a semi-automatic work cycle.

## **BED – THE BOX-SHAPED**

rigidly ribbed bed assures vibrationless performance, even under the heaviest loads. The triangular section of the bed together with the sloping position of the saddle provides a good discharge of chips to the chip container (chip truck) what is an especially important feature where a high output is expected.

## **M A I N D R I V E**

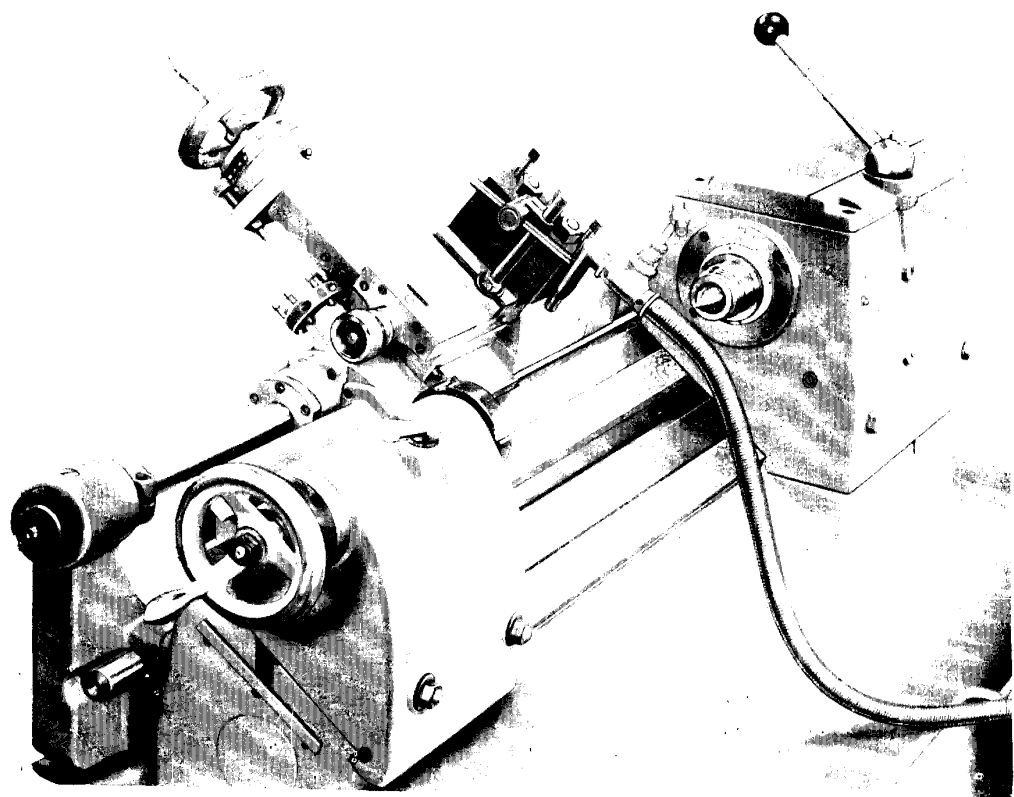
The main drive consists of an electric motor mounted on tilting plate inside the machine body. The movement is transferred to the spindle directly from the motor pulley by means of a set of V-belts.

As a two-speed motor is applied as well as exchangeable two-step belt pulleys, eight spindle speeds are obtained ranging from 770 – 3770 r.p.m.

## **H E A D S T O C K**

The spindle made of high-grade heat-treated steel runs in rolling bearings with the possibility of eliminating excessive backlashes. Axial forces evolved during turning operations are taken up by two thrust ball bearings.

A two-step belt pulley running in rolling bearings is fixed on the spindle together with a multi-plate clutch and brake. One lever engages and brakes spindle.





## S A D D L E

The saddle is mounted obliquely on the prismatic bed guideways. Two levers situated on the front wall of the machine body control the hydraulic infinitely variable saddle drive. One lever controls the working feed, the rapid traverse and the rapid reverse traverse.

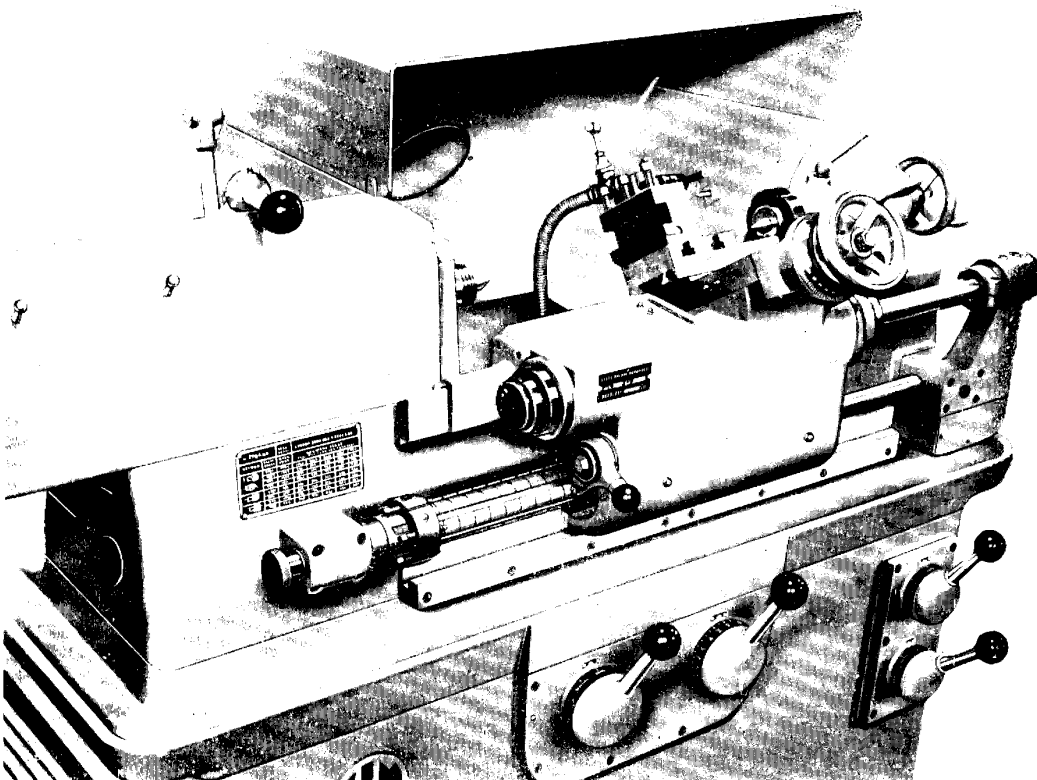
The second lever serves for stepless varying of the feed during work. For the purpose of shortening time required for machining, when turning multi-stepped shafts, a stop-dog drum has been devised limiting the working movements of the saddle, whereas the reverse rapid movement of the saddle is limited by a stop dog.

## T A I L S T O C K

The tailstock is fixed in position on the bed by two hook bolts. A live centre revolving on rolling bearings is built into the adjustable sleeve. An additional expanding sleeve adjusted by means of a nut, serves for maintaining the position of the centre in the spindle axis as well as for eliminating axial backlashes evolved in the tailstock sleeve.

## HYDRAULIC SADDLE CONTROL

provides a semi-automatic work cycle. A pump of simple and uncomplicated design of variable output, driven by a separate electric motor and distribution valve controlled manually by a train of levers guarantees reliable and durable performance.



## CHIP TRUCK AND GUARD

A chip truck located at the rear of the machine under the saddle plate has been devised for removing chips. A guard on the other hand protects the operator from flying chips and from getting splashed with the coolant.

The overall dimensions of the guard, protecting the chip truck, as well as its shape are designed for protecting the operator and for directing chips into the truck. These dimensions are adapted to those of the lathe.

In its bottom part, the guard has a transparent screen through which the lamp located behind it throws light on the workpiece.

## COOLING ARRANGEMENT

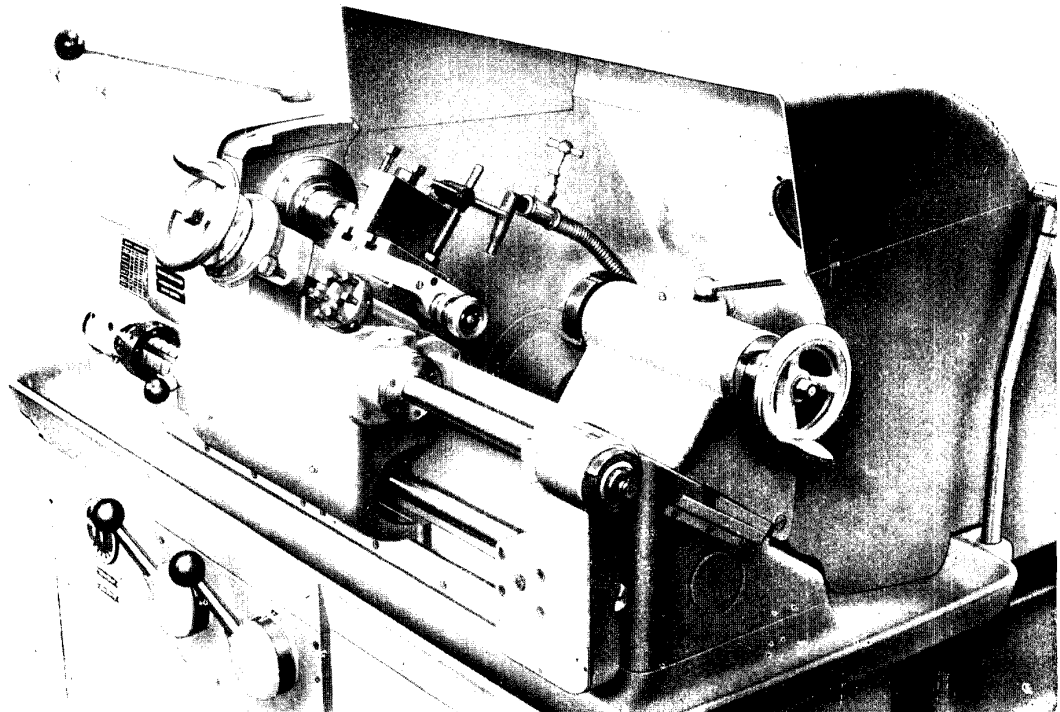
The tool cooling arrangement is located at the rear of the machine and consists of a tank, electropump fixed to it and pipes supplying the coolant to the tool.

## ELECTRIC INSTALLATION

The main drive motor, hydraulic pump motor and the whole electric installation is accommodated inside the bed base. Main motor control is performed by a lever which at the same time starts the hydraulic pump motor.

The coolant pump motor is equipped with a separate installation and is set in motion by a change-over switch.

The motors and electric installation can be executed to the given voltage in compliance with the customer's requests.



## LUBRICATION

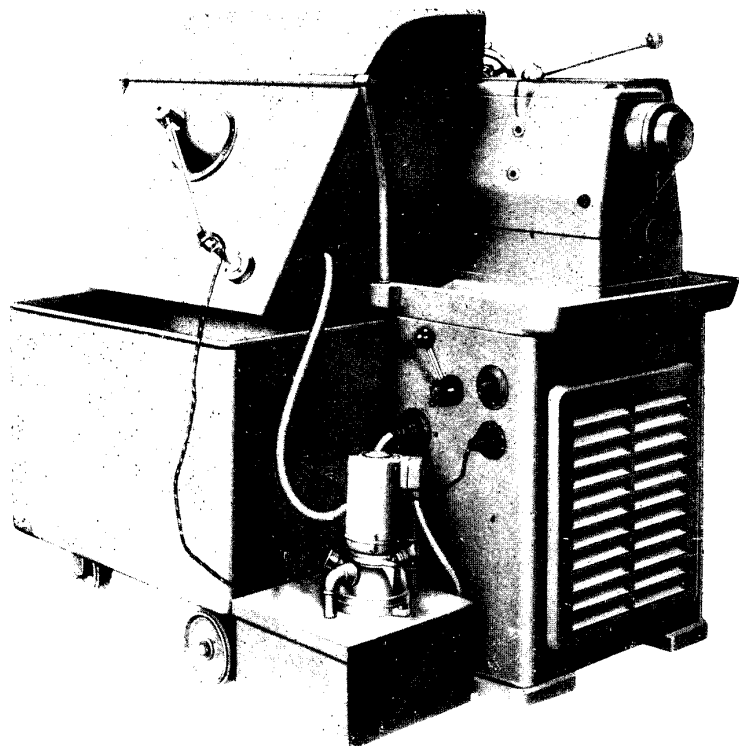
The individual units of the turning lathe are lubricated through nipples and also directly by an oiler according to indications on the drawing included to the service instruction.

## STANDARD EQUIPMENT

Stop drum with 6 adjustable stop dogs  
Three-jaw chuck plate  $\varnothing$  130 mm. (5 $\frac{1}{8}$ "")  
Catch plate  $\varnothing$  115 mm. (4 $\frac{1}{2}$ "")  
Standard toolpost  
Cooling installation including electropump  
Set of spanners  
Guideways guards — 3 items  
Dead centre  
Main guard  
Front adjustable guard  
Chip truck  
Lamp

## SPECIAL EQUIPMENT

Two-jaw chuck (self-clamping carrier)  
Three-jaw chuck  
Recessing operations slide  
Taper turning slide  
Four-tool post  
Boring tool-post  
Open steady



## CHARACTERISTIC DIMENSIONS

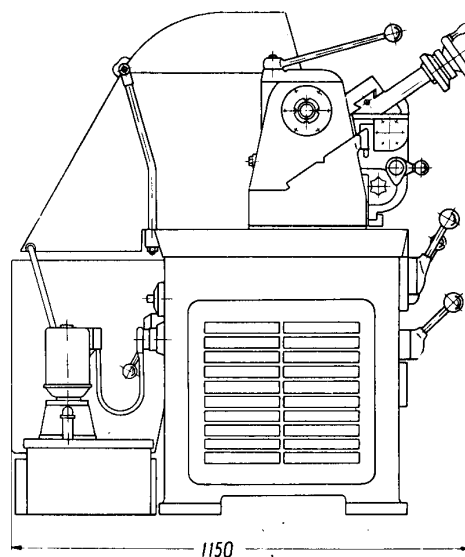
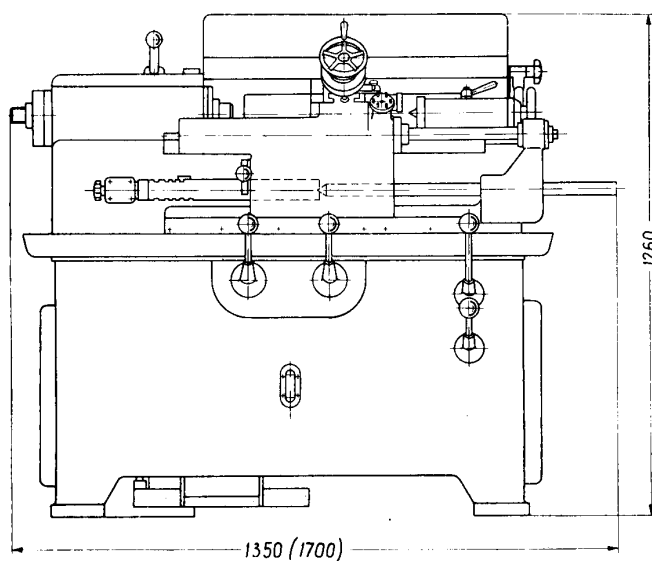
Longitudinal feed range, depending on spindle speed

	Metric	English		Longitudinal feeds depending on the position of the feed lever on the scale "0-10"	
Height of centres over bed (vertical to the inclined plane of the bed)	mm. 120	4 <sup>1</sup> / <sub>4</sub> "	Spindle r.p.m.	mm. per rev.	in. per rev.
Distance between centres	mm. 400	15 <sup>1</sup> / <sub>4</sub> "			
Max. turning length in centres	mm. 375	14 <sup>1</sup> / <sub>4</sub> "			
Max. turning length in the three-jaw chuck	mm. 340	13 <sup>3</sup> / <sub>8</sub> "	770	0-1,52	0-0,06
Cross slide traverse	mm. 75	2 <sup>15</sup> / <sub>16</sub> "	1140	0-1,01	0-0,04
Max. steel turning diameter	mm. 80	3 <sup>1</sup> / <sub>8</sub> "	1420	0-0,81	0-0,032
Max. light metal turning diameter	mm. 160	5 <sup>5</sup> / <sub>16</sub> "	1520	0-0,76	0-0,03
Number of spindle speeds	8		2900	0-0,61	0-0,024
Spindle speed from small motor pulley	r.p.m. 770-1140		2230	0-0,51	0-0,02
	1520-2230		2800	0-0,41	0-0,016
Spindle speed from large motor pulley	r.p.m. 1420-1900		3770	0-0,30	0-0,012
	2800-3770				

	Metric	English
for a standard tool-post	20 - 16	<sup>3</sup> / <sub>4</sub> - <sup>5</sup> / <sub>8</sub> "
	mm. 130	5 <sup>1</sup> / <sub>4</sub> "
Cutter dimensions: for a 4-cutter tool-post	16 - 16	<sup>5</sup> / <sub>8</sub> - <sup>5</sup> / <sub>8</sub> "
	mm. 95	3 <sup>3</sup> / <sub>4</sub> "
Tailstock sleeve traverse with centre	mm. 65	2 <sup>1</sup> / <sub>16</sub> "
Tailstock sleeve diameter	mm. 52	2 <sup>1</sup> / <sub>16</sub> "

## ELECTRIC MOTORS

	Metric	English		Metric	English
Main drive motor power	KW 2.5 3.1	HP 3.4/4.2	Electropump drive motor	r.p.m. n. 2820	speed
Main drive motor speed	r.p.m. n. 1430 2820		Electropump output		1.8 gall.
Hydraulic drive motor power	KW 0.5	HP 0.68	Net weight of the turning lathe	KG 880	lbs. 1940
Hydraulic drive motor speed	r.p.m. 945		Overall dimensions of the machine (length - height - width)	mm. 1350 (1700)	in. 53 (67)
Electropump (coolant arrangement) drive motor power	KW 0.08	HP 0.12		1150 x 1260	45 x 50



## ADDITIONAL EQUIPMENT

### 1. TWO-JAW CHUCK-SELF CLAMPING

allows for quick fixing of the workpiece when machining shafts in series. The clamp is equipped with a special device preventing self-release in case the spindle is suddenly stopped.

### 2. THREE-JAW CHUCK

self-centering, 130 mm. ( $5\frac{1}{8}$ ") in diameter, with fixing plate protected against self-release in case the spindle is suddenly stopped.

### 3. RECESSING OPERATIONS SLIDE

used for recessing shafts produced in series, consists of a base fixed to the bed adjustable cross slide and tool post. The slide moves in the direction of the spindle axis by means of a rack actuated by a toothed shaft coupled to a lever.

### 4. TAPER TURNING SLIDE

for turning slight convergency tapers on the saddle plate instead of the standard slide. It can also serve for form turning after the guide ledge has been removed and the copying attachment with inside guiding rollers is mounted.

### 5. FOUR-TOOL POST

fixed on the top slide instead of the standard tool post. Tools can be rapidly changed by turning the post round its axis. The tool-post is automatically placed in the next working position by a locking device.

### 6. BORING TOOL POST

fixed on the top-slide. The cutter is here clamped parallel to the spindle axis and can be set to the required height by means of an adjusting shim.

### 7. ROLLER OPEN STEADY

serves for upholding long shafts of small diameters during work, fixed in the saddle slide with bolts. The rollers are adjusted to various shaft diameters by setting bolts.

British equivalents are approximate only  
Minor changes in design, construction, dimensions and weight reserved

SOLE EXPORTERS

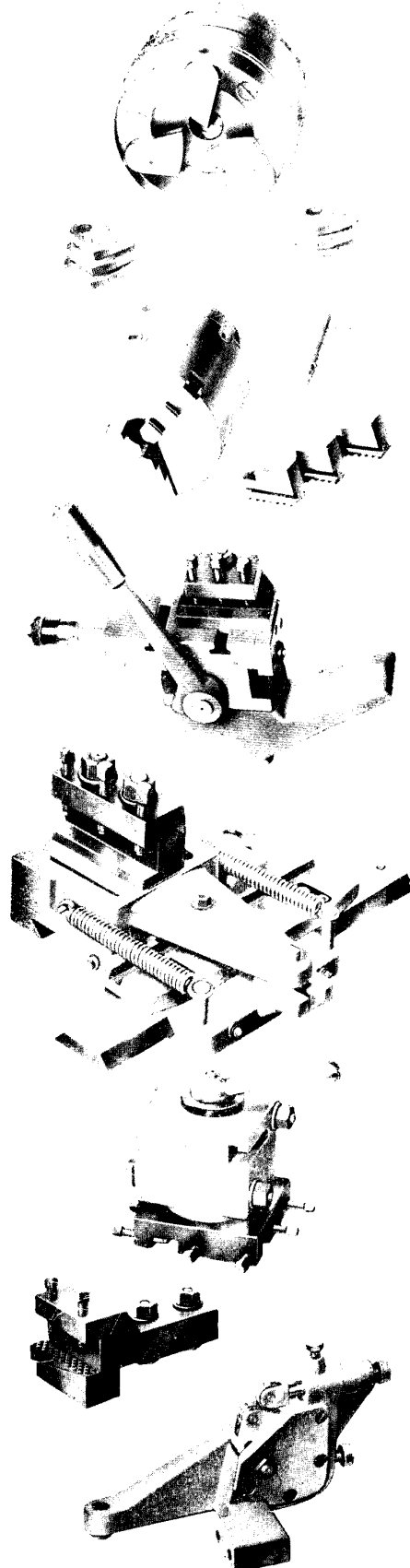


**METALEX**

POLAND, WARSZAWA, MOKOTOWSKA 47

P. O. BOX 442  
TELEGRAMS METALEX WARSZAWA

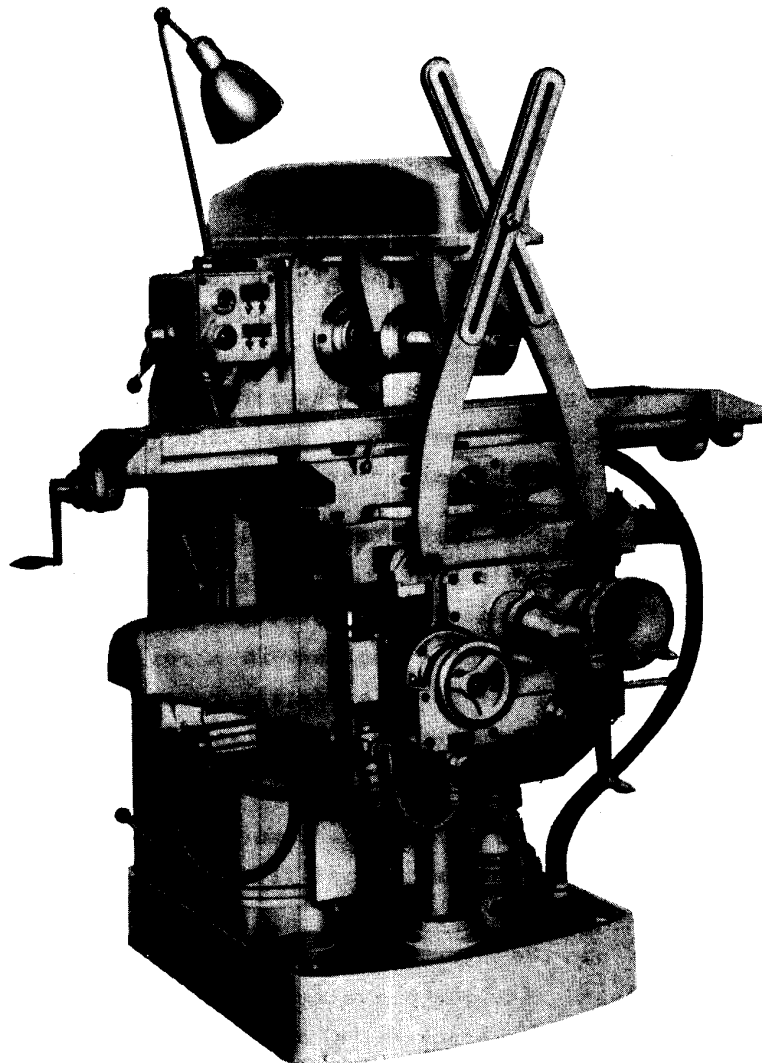
POLISH FOREIGN TRADE  
PUBLICATIONS — WARSZAWA  
Printed in Poland  
in ŁÓDŹ



4.

## UNIVERSAL MILLING MACHINE

**FWB  
25**



SOLE EXPORTERS :



**METALEXPORT**

P.O. BOX 442, WARSZAWA, CABLES : METALEX - WARSZAWA

# UNIVERSAL MILLING MACHINE

## FWB-25

The type FWB-25 is a universal milling machine of the series FWB, comprising also horizontal and vertical models. Most up-to-date design, robust construction, and high spindle torque make the machine extremely versatile.

The outstanding features, viz:

High output,  
Extreme accuracy of work,  
Ready operation,

have been achieved by rigid and strong construction of the stand and knee, wide range of spindle speeds and feeds, quick feed in all directions for idling of table and bracket, quick variation of speeds and feeds by means of cam gears, easy access to all mechanisms for assembly and dismantling, the use of high-strength alloy steel, resistant to wear, for all essential components of the machine, and accurate and careful finish.

*Spindle.* The spindle of high-strength alloy steel is hardened. The convergence of the internal spindle nose taper executed to ISA Standards is 7:24. The front part of the spindle is mounted in two rolling bearings; in axial direction the spindle is supported in a roller bearing. The heavy flywheel ensures even run of the spindle; furthermore, smooth run of the spindle at high speeds is guaranteed by the elastic drive through V-belts. Quick stopping of the spindle is operated by means of counter-current.

*Knee.* All feed mechanisms are accommodated in the knee. The feed drive is effected by means of an individual flange motor. Change of feed is operated by a cam gear.

The traverse of the knee, slide and table is limited by stops. A safety clutch is mounted into the drive mechanism to disengage the drive as soon as one of the feeds is blocked in consequence of tool damage or for other reasons. The levers for engagement of the vertical and transverse power feed as well as the hand wheel for feed change are fitted to the front of the knee. The lever system and arrangement of operation directions make mistakes of the operator impossible. A special blocking device protects from wrong engagement of power- and hand-feed.

*FWB-25/2*

In some cases, viz. when milling deep grooves or thin-walled objects which for up-milling are difficult to fix, or objects of about 100 kg/sq. mm (142233 lbs/sq.in.) strength, the down milling process (method) yields often better results. For such milling work the complete elimination of backlash in the table lead screw is indispensable. To this effect the lead screw nut is provided with a backlash eliminator. This device eliminates the backlash by tightening two nuts on the screw, however, only when the table is under load of longitudinal resistances, - while during idle run of the table the screw revolves in the nuts.

#### *Electrical Equipment*

The whole electrical equipment is located in the rear part of the machine in a special casing. Contactors, controlled from the operator's stand, are intended for starting and stopping the motors. Thermal releases protect the motors, by cutting off current supply in case of overload. As soon as the windings are cooled, the releases again switch the current on.

*Lubrication* of the guideways and of other parts of the knee and the slide is done by means of a multi-plunger pump, turned by hand once a day. The machine is provided with a device for coolant supply to the workpiece dealt with. The coolant tank is accommodated in the machine base.

#### *Standard Equipment (supplied with the machine)*

1 milling arbor dia. 27 mm (1 17/64") with set of sleeves  
Tightening bolt and nut  
Set of spanners  
Grease gun  
3 spare vee belts  
2 arbor supports and braces  
Workshop lamp

#### *Special Equipment (at extra charge)*

2 milling arbors, dia. 22 mm (55/64") and dia. 32 mm (1 1/16"). complete  
Double-swivel head for vertical milling  
Universal dividing head with tailstock, change wheel box and set of gears  
Rotary table with scale graduated in grades and minutes  
Universal vice or standard vice  
Universal dividing head with increased range

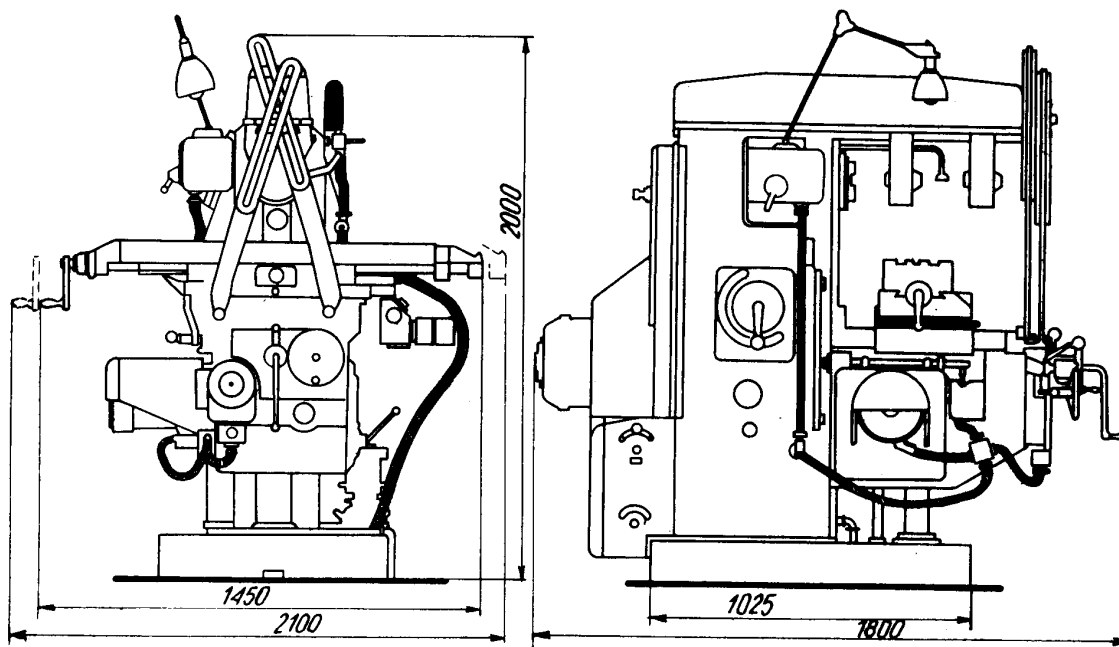
*FWB-25/3*



**Leading particulars**

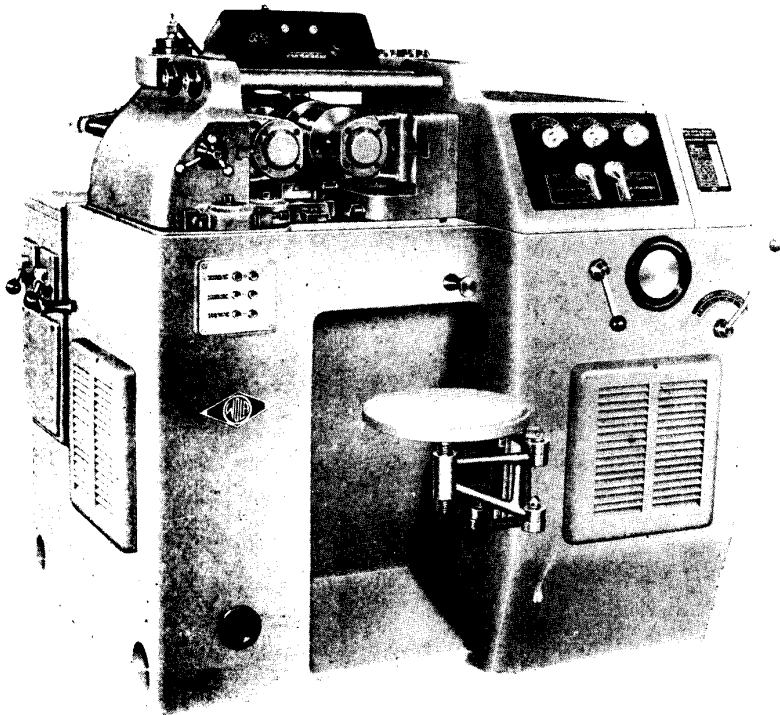
Total table surface . . . . .	1120 × 260 mm (3 8" × 10 1/4")
Working surface of table . . . . .	1000 × 250 mm (3 3" × 9 27/32")
Number of grooves in table . . . . .	3
Width of table grooves . . . . .	14 mm (5/8")
Max. table swivel angle . . . . .	40°
Swivel scale graduation . . . . .	1°
Max. table adjustment:	
manual adjust-      longitudinal . . . . .	.650 mm (2 19/32")
ment              transversal . . . . .	.200 mm (7/8")
vertical . . . . .	.350 mm (1 125/32")
power adjust-      longitudinal . . . . .	.650 mm (2 19/32")
ment              transversal . . . . .	.185 mm (7 9/32")
vertical . . . . .	.340 mm (1 13/8")
Max. distance from table to spindle axis . . . . .	.350 mm (1 125/32")
Min. distance from table to spindle axis . . . . .	.30 mm (1 3/16")
Max. distance from vertical guide to face of steady . . . . .	510 mm (1 8 1/8")
Max. distance from spindle nose to face of steady . . . . .	470 mm (1 6 1/2")
Distance from spindle axis to beam guide . . . . .	.150 mm (5 29/32")
Spindle diameter in front bearing . . . . .	.75 mm (3")
Spindle nose . . . . .	.44 mm (1 47/64")
Number of spindle speeds . . . . .	16
Range of spindle speeds . . . . .	65-1800 r. p. m.
Number of feeds . . . . .	16
Range of feeds: longitudinal . . . . .	35-980 mm/min (1 3/8" - 3 3"/min)
transversal . . . . .	25-765 mm/min (63/64" - 2 6"/min)
vertical . . . . .	12-380 mm/min (1 5/32" - 1 3"/min)
Range of quick feeds (in both directions):	
longitudinal . . . . .	2900 mm/min (9 6"/min)
transversal . . . . .	2300 mm/min (7 7"/min)
vertical . . . . .	1150 mm/min (3 9"/min)
Spindle drive motor rating . . . . .	4 kW (5.5 H. P.)
Motor speed . . . . .	1440 r. p. m.
Feed drive motor rating . . . . .	1.1 kW (1.5 H. P.)
Motor speed . . . . .	1440 r. p. m.
Rating of electric pump motor . . . . .	0.8 kW (1.1 H. P.)
Overall dimensions . . . . .	1450 × 1800 × 1900 mm (4 9" × 5 11" × 6 3")
Approx. weight of machine . . . . .	2000 kg (39 cwt. 41 lbs.)

English equivalents are approximate only



8

# WGH-80



## THREAD ROLLER





## **THREAD ROLLER**

**WGH-80**

### **DESIGNATION**

Owing to the application of the cold rolling process, the thread roller type WGH 80 is a highly productive machine.

It is excellently suited for rolling cylindrical and taper external threads on all types of screws, taps, gauges and machine parts, whose dimensions are within the machine range and providing the blank has suitable properties for cold forming.

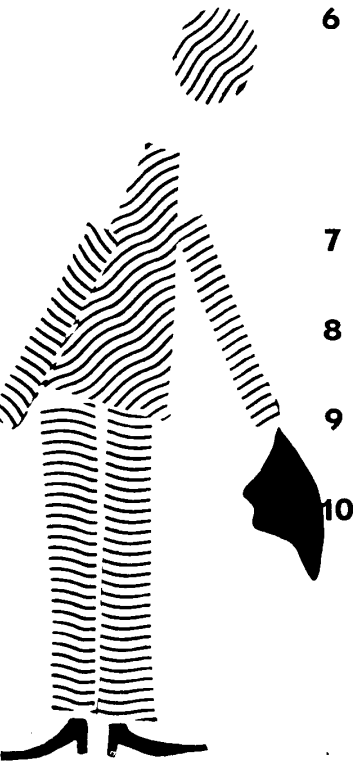
Besides threading it is equally versatile for knurling, serrating, profile rolling etc.

Owing to its high output capacity, it is primarily adapted for large or small serial production.

**If you care for good service, satisfaction and benefit** when selecting a thread roller, remember, that our machine of the WGH-80 type has all the features of competitive machines rated as the best in the world.

These are as follows:

- 1** The most modern compact, rigid and robust design guarantees accuracy of performance.
- 2** Works on the principle of the latest method of cold rolling which ensures:
  - a) great tensile strength because the material is caused to flow into its new form so that the grain structure follows the thread contour,
  - b) high accuracy and finish of thread in no case inferior to ground threads.
- 3** High output (see diagram in the text).
- 4** A wide range of rolled threads Whitworth's or metric from 3—85 mm. ( $\frac{1}{8}$ —3 $\frac{3}{8}$  in.) dia. and lengths of 125 mm. ( $4\frac{7}{8}$  in.).
- 5** Easy and convenient servicing in view of:
  - a) centralized controlling elements,
  - b) operation from a sitting position,
  - c) application of an automatic recorder, showing the total number of pieces rolled,
  - d) independence of units during disassembly (extremely important during repair).
- 6** Reliability of operation owing to:
  - a) application of hydraulic feed which provides a quiet and smooth run without vibrations,
  - b) manufacture of parts subjected to high wear and load of high grade alloy steel,
  - c) automatic central lubrication and cooling of all basic units.
- 7** Easy and rapid resetting of the machine — for rolling a new series of parts.
- 8** Complete operational safety because of waste elimination and adequate cover of revolving mechanisms.
- 9** The advantage of setting the machine for an automatic, semi-automatic or manual control of operation cycle.
- 10** The application of a timer which guarantees uniformity of thread and rolling time.

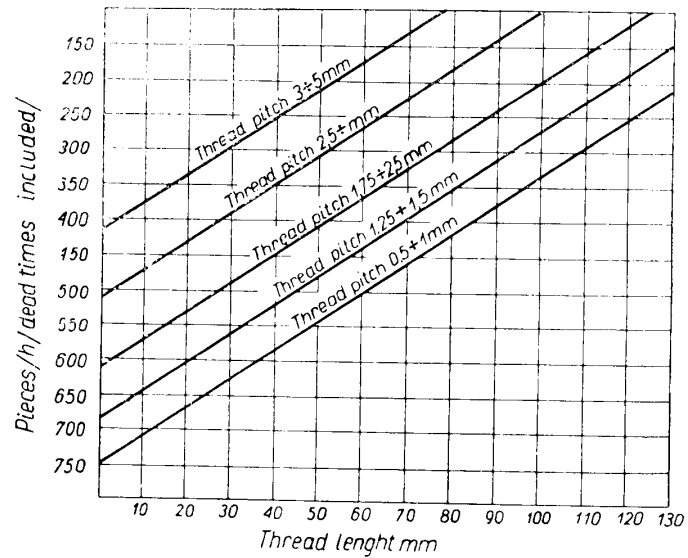


**Output.** The output of rolled thread per hour is dependant upon both the size and shape of thread as well as on the method of blank holding. An important output factor constitutes the quality of thread rolls.

Estimated figures covering output per hour are contained in the table given below.

**Note:** Through the application of a blank feeding magazine, the output per hour increases 2-3 fold. These feeding magazines are supplied only on special request.

The table has been prepared for steel of a tensile strength  $R_r = 90$  kg. per square millimeter (57 tons per square in.). For steel of tensile strength  $R_r > 90$  kg. per square millimeter, the output per hour is subject to a 15% reduction. With a tensile strength of  $R_r < 90$  kg. per square millimeter, the output per hour increases by about 20%.



**WGH-80**

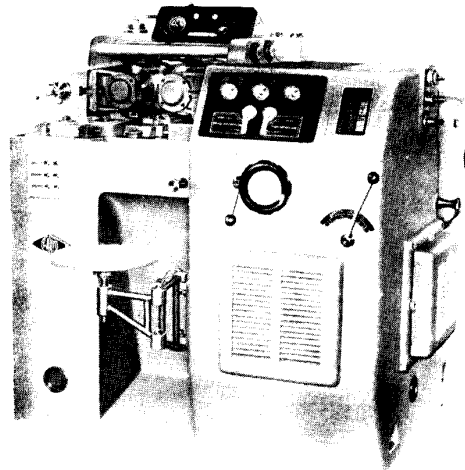
**Accuracy and finish of thread surface.** The accuracy of rolled thread is very high because the thread forming rollers act as a sort of dies.

The rollers are executed on extremely precise thread grinders, hence rolled thread size and dimensions are an exact reproduction of the ground threads.

Besides increased thread strength assured by the process of cold rolling, a highly smooth surface in no way inferior to surface smoothness of ground threads, is obtained largely because of the slip which occurs between the rolled blank and the rollers as a result of the difference between the circumferential velocity of the inner and outer diameter of the rolled thread. Assuming that the tool (rollers) is executed within the prescribed tolerance, the design of our thread rolling machine allows to obtain the pitch dia. of the rolled piece with an accuracy up to 0.01 mm. (0.0004 in.). Besides the roller accuracy and that of the machine itself, the accuracy of the rolled form is influenced by the following factors:

- a) homogeneity of rolled material,
- b) proper blank dia.,
- c) rolling pressure,
- d) rolling time,
- e) rolls speed,
- f) rate of feed.

In practice these factors are in relation to each other. The last four can be adjusted within admissible limits for the machine for the execution of a given thread.



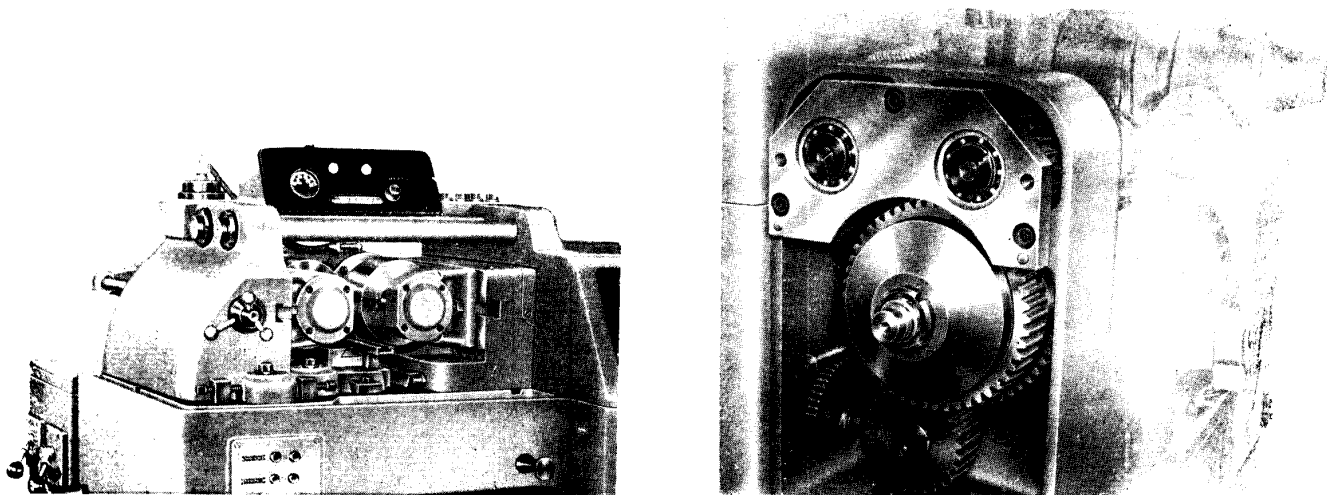
## DESIGN



**Body.** The machine's reliable operation is assured by a cast iron, amply ribbed stand which constitutes its base. The stand is designed to contain a box-shaped double chamber oil tank. The left tank chamber stores coolant while the right tank chamber contains oil for the hydraulic system.

The large tank capacity with an ample oil surface ensures intensive cooling of the oil stored in the tank. A port hole protected with a cover located on the right hand side of the body, somewhat protruding forward, serves as an inspection opening for the pump and for the exchange of the hydraulic oil. A similar port hole located on the left hand side of the body serves to exchange the coolant. The entire machine consists of the following self-contained assemblies: speed box, swivel column, slide, pump, hydraulic distributor, inward feed gear, timer and a cabinet for electrical equipment.

Thus the dismantling of any of the units can be done without disturbing the rest.



**Roll spindles and drive.** Both spindles serve to hold the thread rolls. The left hand side spindle is mounted in a swivel headstock and the one on the right hand side in a saddle. The headstock's swivel capacity in relation to the roll mounted in the saddle is indispensable for taper thread rolling. Its swivel is restricted by two transferable stop dogs mounted on the face side of the headstock. The spindles run in radial roller and ball thrust bearings. The front supporting bearings can be removed always during the exchange of rolls.

A mechanism designed for alignment of rollers and to eliminate axial play of bearings is mounted at the rear spindle end in the headstock.

Both saddle and spindle move perpendicularly in relation to the left hand spindle axis on stand guideways. This movement is actuated by the hydraulic drive while its return motion is actuated by means of a spring.

Both spindles are driven by a flanged electric motor through a speed box and worm gearing.

The speed is set according to the speed chart by means of a lever mounted in the front of the machine at the right hand side of the stand.

For revolving the spindles one at a time, the speed box is provided with a special planetary gearing and a lever transmitting the drive by means of a claw clutch to either of the spindles.

Depending on the position of this lever, when turning the hand operated wheel, either the right or left hand spindle rotates. The hand operated wheel and lever are mounted conveniently at the front of the machine besides the lever for speed regulation.



**Drive and control of the hydraulic system.** The hydraulic system of the thread rolling machine consists of two basic units: of the pressure system and of a timer. Both units are fed by one twin pump. The pressure unit operates the saddle and presses the rollers against the rolled workpiece. The timer maintains the same rolling time for all rolled blanks of given size.

The rolling time is regulated by setting the breaker which at a given moment cuts off the supply of current to the control coil of the distributor. The oil pressure in cylinders drops automatically and thus the rolling process becomes disengaged and the spring withdraws the saddle to its starting position.

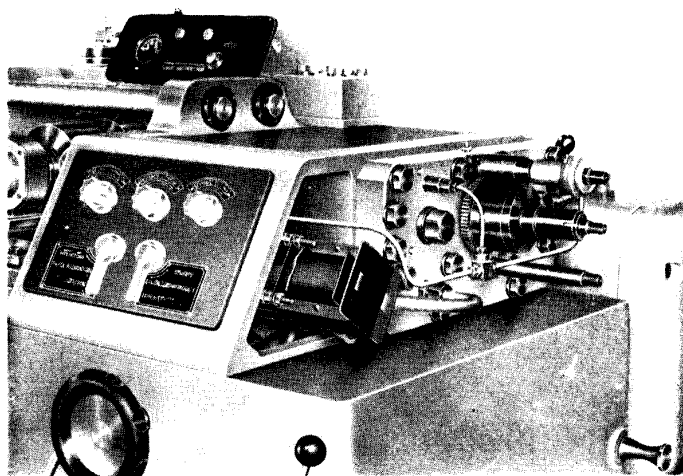
Control lights operated by contacts mounted on the hydraulic cylinder allow the checking of the operation cycle, i. e.:

- the green light indicated lack of pressure in the pipe system,
- the red light appears when the machine operates under pressure.

During loading and unloading of blanks, only the green light is burning.

There is also built into the control panel a recording device registering the number of finished pieces. The hydraulic system is equipped with a pressure gauge and a series of pressure regulating valves, air venting and pressure throttling valves during idle run etc.

The hydraulic system is controlled by means of knobs on the control panel of the hydraulic distributor.

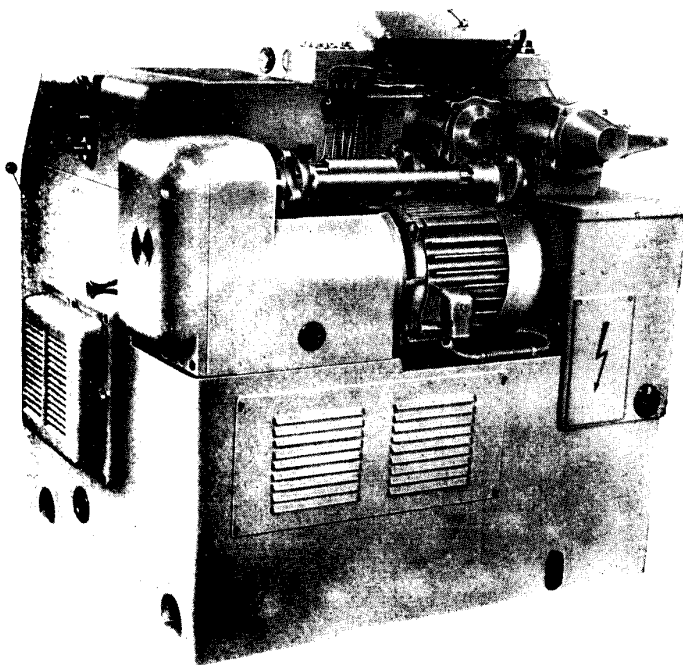


**Lubrication and cooling equipment.** A special piston pump mounted on the shaft of the speed box and driven by an eccentric bush provides the oil for the cooling and lubrication of the thread rolls and blanks. The pump supplies the oil from the tank in the stand to the tool and workpiece, whence it returns via an ample tray with filter back to the tank.

An overflow valve protects the pump against overload and for this reason the tap built into the oil supply pipe line, can be closed even during the operation of the pump.

**Electrical equipment.** A cabinet with the following electrical equipment is located in the stand's rear part: main switch, relay switch for the direction of spindle revolutions, motor switches and switch of the distributor control coil, fuses and transformers. Push buttons switching off the electric motor and distributor coil are mounted on the left hand side of the body's front wall.

The timer is fitted with 6 V signalling lights. On the cabinet wall a 24 V socket is provided. The electric motors and equipment are in general for 220/380 V and 50 cycles, but both the voltage and frequency can be made to suit local power supply.



**Types of blank supports and fixtures.** Depending on the type of the workpiece, various kinds of supports and fixtures can be supplied such as: supporting rests, centres device or in case of hollow workpieces, mandrels of appropriate size.

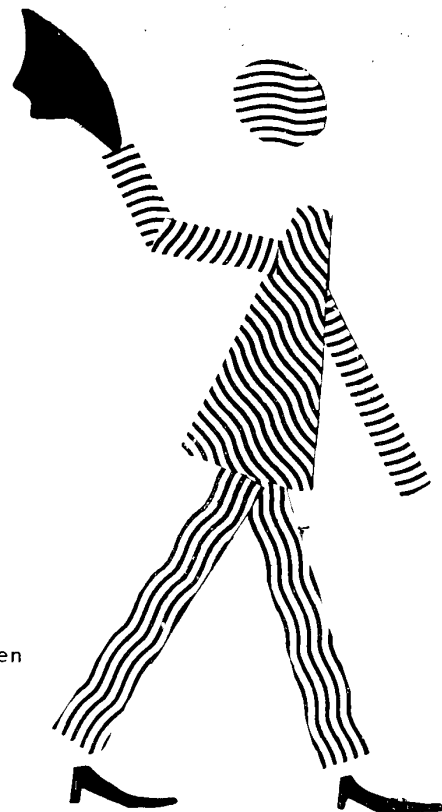
Rolling the blank with a support rest is most frequently used because of the very short idle time. The rests together with appropriate holders are fixed on the machined surface of the machine stand. The support rests are exchangeable to suit the rolled blank dia.

The exchangeable support rests are supplied as special equipment. The heights of these support rests are calculated in such a way, that the blank axis will be 0,2 mm. below the spindle axis.

When preparing an order for special equipment of the thread roller, please specify precisely: thread type, dia., thread pitch, length, degree of accuracy and rate of production in order to adapt the machine to these requirements.

The centre device is used only when threads on the workpieces are to be rolled coaxially. During such thread rolling, the blanks rest accurately at the height of the spindle axis, a positive feature for the distribution of forces prevalent during a thread rolling operation. This arrangement is likewise fixed on the machine surface of the stand by means of vee blocks and clamps. The output of thread rolling between centres is lower however, because of manual loading and unloading of blanks, yet

the performance is more accurate than that of rolled thread with the aid of a support rest. For rolling of long blanks up to 300 mm. ( $11\frac{13}{16}$ " ) special spring loaded prismatic supports are used; these are attached to the support rest to hold the end of the blank. This arrangement facilitates servicing and eliminates blank vibration. On thin walled hollow blanks, the thread can be rolled only after the application of suitable mandrels protecting the blanks against deformation due to the heavy pressure of rollers.



### Standard Equipment

- 1 crank
- 3 sling bars for overhead transport of machine
- Service manual

### Special Equipment (at extra charge)

1. Set of rolls
2. Set of support rests and fixtures
3. Set of distance rings
4. Automatic blank feeding device, supplied to order for given size and shape of the workpiece

### SPECIFICATION

Thread types	Range of diameters	Pitch range	Thread length
Metric	3–85 mm.	0,5–6 mm.	125 mm.
Withworth	3–85 mm. $\frac{1}{8}$ – $3\frac{11}{32}$ in.	28 t p i	$4\frac{59}{64}$ in.
Distance of spindle axis to bed		mm. 130	in. $5\frac{1}{8}$
Roller maximum dia.		mm. 165	in. $6\frac{1}{2}$
Roller maximum width		mm. 130	in. $5\frac{1}{8}$
Max. normal length of rolled thread		mm. 125	in. $4\frac{59}{64}$
Spindle dia.		mm. 54	in. $2\frac{1}{8}$
Roller pressure range		kg. 300–18000	lbs. 660–39680
4 spindle speed ranges		r. p. m. 16–25–40–63	
Main electric motor: power		kW 4.5	H. P. 6
speed		r. p. m. 1500	
Pump motor: power		kW 1.7	H. P. 2.3
Weight of machine		kg. 1940	lbs. 4270
Packing case volume		cub. m. 4.5	cub. ft. 158

British equivalents are approximate only.

Minor changes in design and dimensions reserved.



S O L E E X P O R T E R S

**METALEXPORT**

POLAND, WARSZAWA, MOKOTOWSKA 49

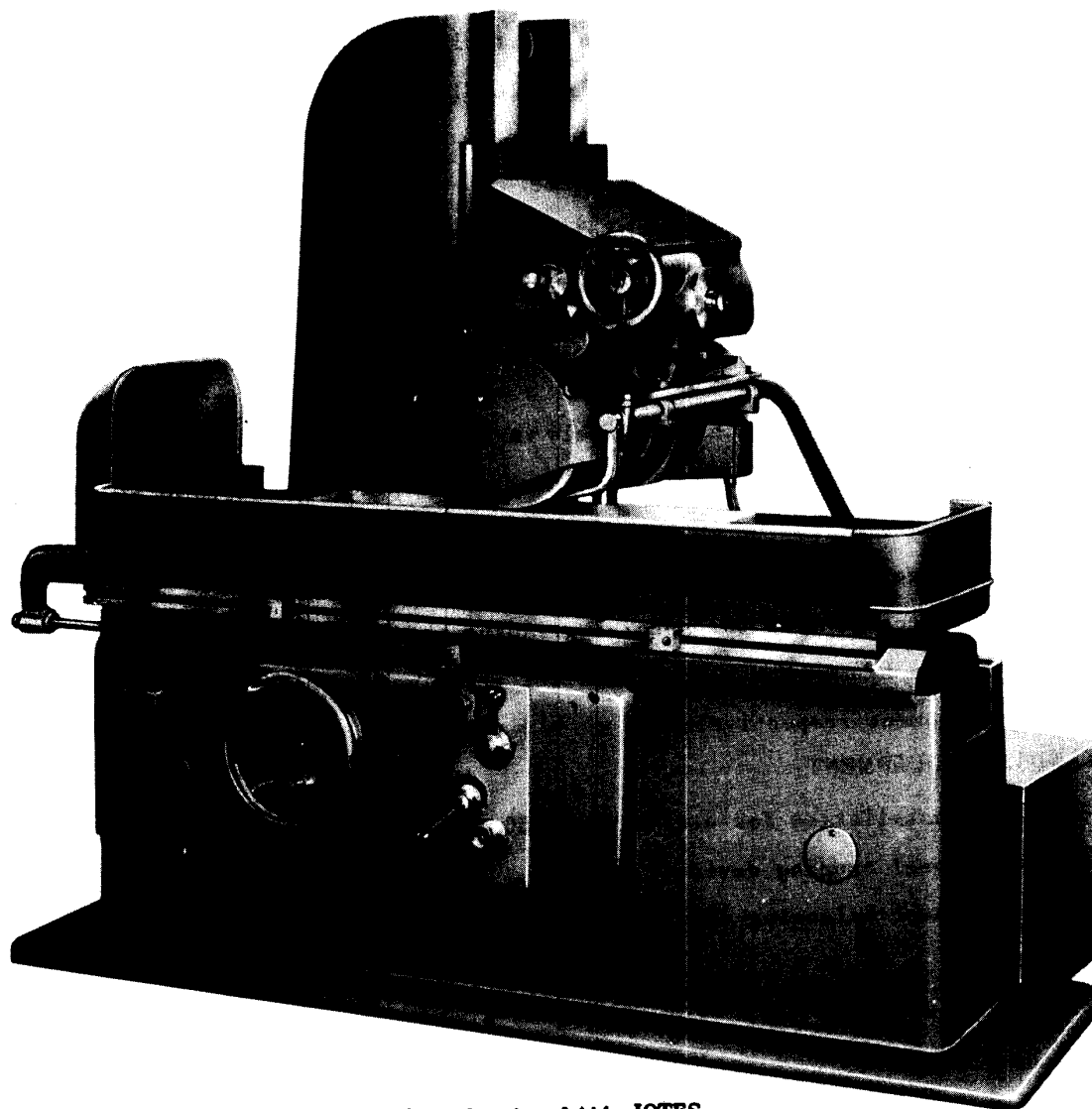
P. O. BOX. 442

TELEGRAMS: METALEX - WARSZAWA

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# **SURFACE GRINDER**

## **Type SPB-30**



**MAKERS: Zakłady im. J. Strzelczyka, Łódź JOTES**

**SOLE EXPORTERS :**



# **METALEXPORT**

**P.O. BOX 442, WARSZAWA, CABLES : METALEX - WARSZAWA**

The SPB grinder with horizontal spindle is widely used in industry and small workshops, particularly in the production of tools for machining surfaces with high accuracy, head faces of gears, rings, antifriction bearings, piston rings, bushes, further for grinding the surfaces of large parts of various kind, such as discs, flange faces, cast covers, etc.

The work dealt with is - according to size and shape - held either in an electromagnetic chuck or directly on the table by means of screws and T-slots.

The work table of the grinder is hydraulically driven

The modern design and the rigid construction of the grinder affords a number of outstanding features which guarantee:

- high accuracy and smooth finish of the surface ground, within a comparatively short machining time,
- high output and efficiency due to both automatic and manual quick change of the work table movement direction,
- hydraulic table drive with infinitely variable speed, ranging from 3 to 30 m/min
- fine automatic or hand-operated continuous or stepped cross feed of the abrasive wheel,
- easy exchange of abrasive wheel,
- grinding to gauge with the special grinding wheel infeed device.

Our SPB-30 can be used for both dry and wet grinding, i.e. with dust collector or cooling equipment respectively.

#### STANDARD EQUIPMENT

Electrical installation for a.c. 3-phase 50 Hz working current.

- 1 abrasive wheel truing device
- 1 abrasive wheel balancing shaft
- 1 table
- 1 set of spanners
- 1 oil can
- 1 instruction manual

#### SPECIAL EQUIPMENT ( supplied at extra charge )

- 1 complete electromagnetic chuck
- 1 complete dust collector
- 1 complete cooling equipment
- 1 complete 24 V electric lighting installation.

SPB-30/2

## SPECIFICATION

Max. grinding length	mm 1000	ins. 39 <sup>3</sup> / <sub>8</sub>
Max. grinding width	mm 300	ins. 11 <sup>13</sup> / <sub>16</sub>
Max. distance of abrasive wheel spindle axis to table face	mm 575	ins. 22 <sup>41</sup> / <sub>64</sub>
Min. distance of abrasive wheel spindle axis to table face	mm 125	ins. 4 <sup>59</sup> / <sub>64</sub>
Table max. feed	mm 1175	ins. 46 <sup>17</sup> / <sub>64</sub>
Table min. feed	mm 200	ins. 7 <sup>7</sup> / <sub>8</sub>
Infinitely variable table feed range	m/min 3 - 30	feet/min 9 - 98
Useful table surface	mm 300x1000	ins. 11 <sup>13</sup> / <sub>16</sub> x39 <sup>3</sup> / <sub>8</sub>
Abrasive wheel max. movement	mm 350	ins. 13 <sup>25</sup> / <sub>32</sub>
Adjustable continuous abrasive wheel feed range (infinitely variable)	m/min. 0.5-4.	feet/min. 1.6 - 14.8
Range of the adjustable abrasive wheel feed for each feed of the work table	mm 3 30	ins. 13/16 - 1 <sup>3</sup> / <sub>16</sub>
Manual movement of the abrasive wheel by one scale division	mm 0.1	ins. 0.994
Manual movement of the abrasive wheel by one revolution of the hand wheel	mm 8	ins. <sup>5</sup> / <sub>16</sub>
Max. infeed of the abrasive wheel to the work piece	mm 400	ins. 15 <sup>3</sup> / <sub>4</sub>
Manual infeed of the abrasive wheel to the work piece by one revolution of the hand wheel	mm 1	ins. <sup>3</sup> / <sub>64</sub>
Abrasive Wheel:		
Max. dia of new abrasive wheel	mm 350	ins. 13 <sup>25</sup> / <sub>32</sub>
Min. dia of worn abrasive wheel	mm 250	ins. 9 <sup>27</sup> / <sub>32</sub>
Abrasive wheel width	mm 40	ins. 1 <sup>37</sup> / <sub>64</sub>
Abrasive wheel hole dia.	mm 127	ins. 5
Abrasive wheel clamping plate dia	mm 197	ins. 7 <sup>3</sup> / <sub>4</sub>
Abrasive wheel speed at 50 cycles	r.p.m. 1440	
Max. circumferential speed of new abrasive wheel	m/sec. 26	feet/sec. 82
Min. circumferential speed of worn abrasive wheel	m/sec. 18.6	feet/sec. 61

SPB-30/3



## ELECTRIC MOTORS

a. abrasive wheel driving motor:	power	kW.	4.5
		HP.	6.1
	speed at 50 cycles	r.p.m.	1440
b. oil pump motor:	power	kW.	2.8
		HP.	3.8
	speed at 50 cycles	r.p.m.	1420
c. cooling pump motor	power	kW.	0.25
		HP.	0.34
	speed at 50 cycles	r.p.m.	2820

## HYDRAULIC INSTALLATION

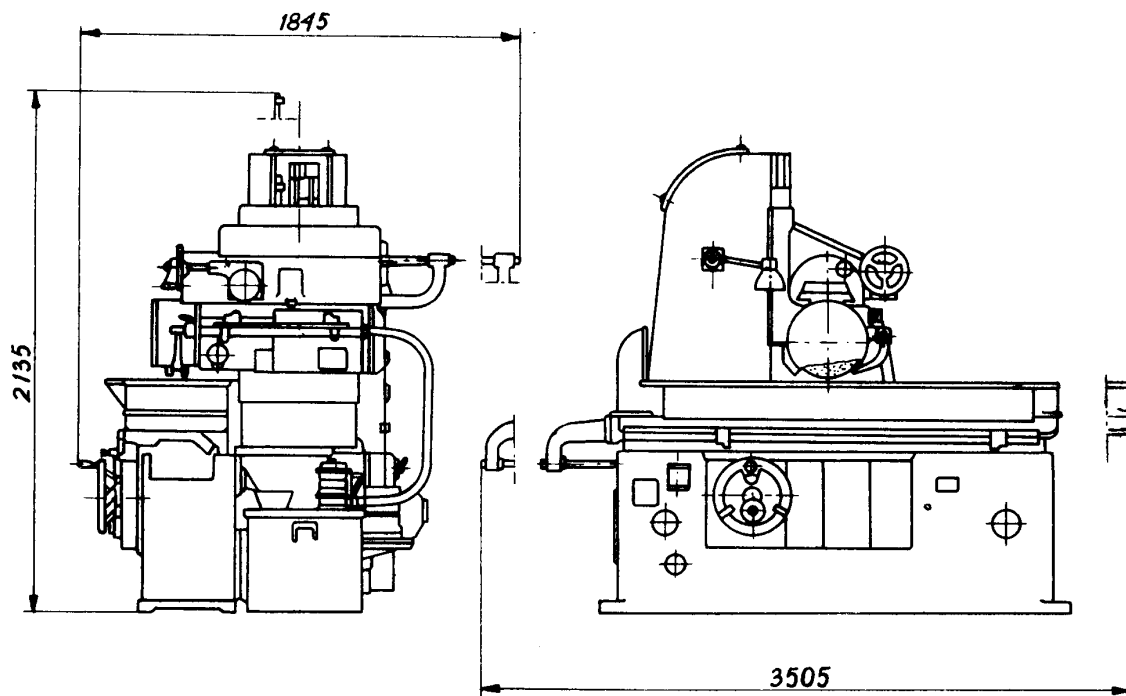
Normal, working pressure	kg/sq. cm 10	lbs/sq.in. 142.2
Oil pump output	ltr/min. 100	Imp. gall/min. 22
Cooling pump output	ltr/min 60	Imp.gall/min. 13.2
Amount of hydraulic liquid in the tank	ltr 130	Imp.gall. 28.6

## Overall dimensions of the grinder:

Length x width x height	mm 3505x1845x2135	ins, 117 x 72.5 x 84
Weight of the grinder	kg 4500	lbs. 9900

The electrical equipment is made for 50 cycles 380 V.a.c. If required, this equipment can be made to the local power supply of the user.

We reserve the right to introduce minor alternations in design.



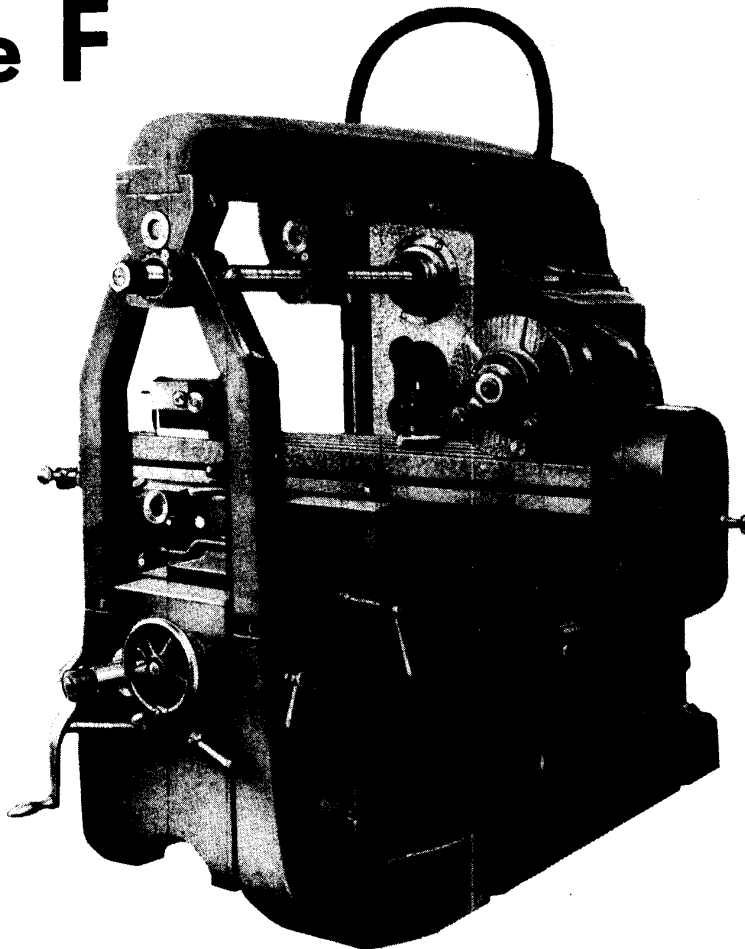
British equivalents are approximate only.

SPB-30/4

NWT-145/57

# MILLING MACHINES

## Type F



The Milling Machines type F are remarkable for their modern construction and, as such, fully meet all requirements in respect of both precision and productive output.

As a result of the wide range of spindle speeds and feed rates, their extremely simple variation, the ready exchange of milling cutters, and easy alteration of the table position the efficiency of these machines is extremely high irrespective of their being used for piece, serial or mass production. Simplicity of operation qualifies them especially for machining work pieces of intricate shapes from a single block clamped once for the whole operation on the machine table.

Speeds of the milling machines are selected so as to make them fit for cutting various materials by means of cutters made of various kinds of tool and high-speed steel, as well as by means of carbide tipped cutters. Alternative high-speed models - FYA, FXA and FWA - with increased speed range - are recommended in all cases dealing with large quantities of non-ferrous work and requiring a wide use of carbide tipped cutters.

Since it is possible to reverse both the direction of spindle rotation and the table feed, these machines can work with both right-hand and left-hand cutters.

The high accuracy of operation of these machines is a consequence of their rigid and robust design, effectually preventing vibrations, as well as of the simple and efficient solution of a number of constructional problems, resulting in the special layout of the spindle bearings, the narrow guide for saddle transversal motion, the high reliability of the knee and saddle clamps.

SOLE EXPORTERS :

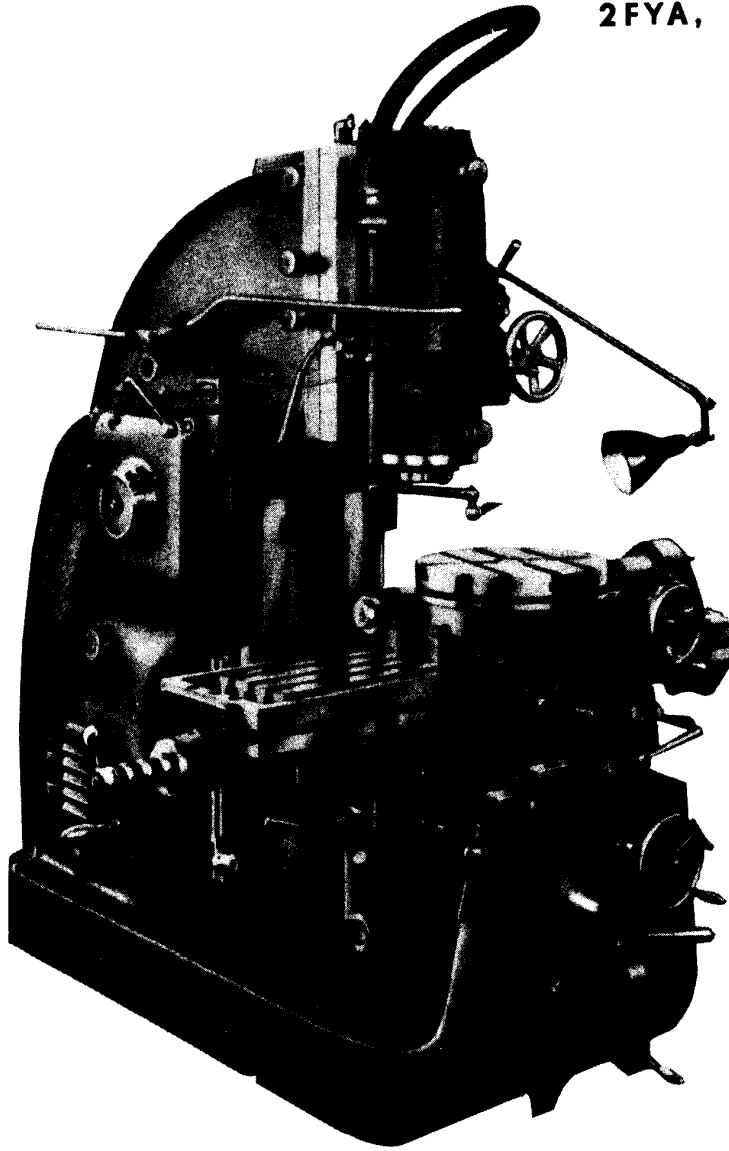


**METALEXPORT**

P.O. BOX 442, WARSZAWA, CABLES : METALEX - WARSZAWA

# Vertical Milling Machines

High-speed models with  
increased speed range  
2FYA, 4FYA



## Standard equipment

- |                                   |                           |
|-----------------------------------|---------------------------|
| 1 coolant pump with piping        | 1 clamping screw with nut |
| 1 cutter arbor, 40 mm. (1½") dia. | 1 set of spanners         |

## Special equipment (at extra charge)

### Recommended

- |                                     |    |
|-------------------------------------|----|
| 1) Power-driven rotary table        | Fd |
| 2) Rotary table indexing attachment | Ff |
| 3) Swivel vice                      | Fp |

### Additional

- |                                     |
|-------------------------------------|
| 1) Hand-driven rotary table (super- |
|-------------------------------------|

fluous if you are in possession of  
the Fd table)

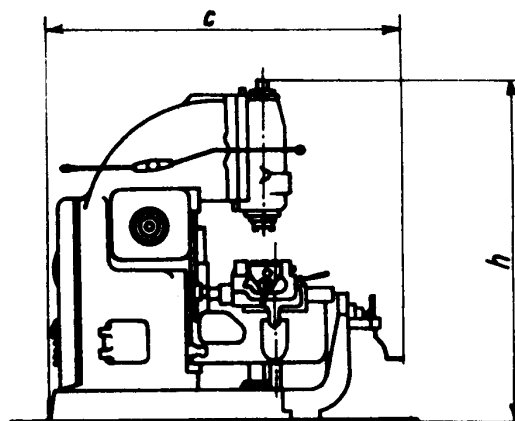
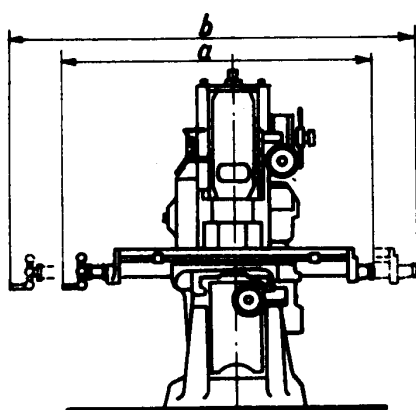
- |                                |     |
|--------------------------------|-----|
| 2) Standard vice               | Fe  |
| 3) Spindle head power feed box | Fs  |
| 4) Front crank-handle          | Fys |
| 5) Universal vice              | Fh  |
| 6) Reducing sleeves            | Fr  |

### Specification of Vertical Milling Machines

Model			2 FYA	4 FYA
Table working surface	mm.		310 × 1250 (1'3 <sup>1</sup> / <sub>16</sub> " × 4'1 <sup>1</sup> / <sub>16</sub> "	410 × 1900 (1'4 <sup>1</sup> / <sub>8</sub> " × 6'2 <sup>1</sup> / <sub>16</sub> "
Table total surface	mm.		310 × 1350 (1'3 <sup>1</sup> / <sub>16</sub> " × 4'5 <sup>1</sup> / <sub>32</sub> "	410 × 2000 (1'4 <sup>1</sup> / <sub>8</sub> " × 6'6 <sup>1</sup> / <sub>4</sub> "
Number of table grooves			3	3
Width of table groove	mm.		18 (4 <sup>1</sup> / <sub>64</sub> "	18 (4 <sup>1</sup> / <sub>64</sub> "
Table power traverse:	longitudinal	mm.	700 (2'3 <sup>1</sup> / <sub>16</sub> "	1065 (3'5 <sup>1</sup> / <sub>16</sub> "
	transversal	mm.	280 (11"	400 (1'3 <sup>3</sup> / <sub>4</sub> "
	vertical	mm.	290 (11 <sup>7</sup> / <sub>16</sub> "	360 (1'2 <sup>5</sup> / <sub>32</sub> "
Spindle head vertical traverse	mm.		150 (5 <sup>29</sup> / <sub>32</sub> "	150 (5 <sup>29</sup> / <sub>32</sub> "
Maximum distance spindle nose to table	mm.		400 (1'3 <sup>3</sup> / <sub>4</sub> "	510 (1'8 <sup>1</sup> / <sub>16</sub> "
Distance spindle axis to column	mm.		360 (1'2 <sup>5</sup> / <sub>32</sub> "	460 (1'6 <sup>1</sup> / <sub>8</sub> "
Spindle diameter in front bearing	mm.		95 (3 <sup>3</sup> / <sub>8</sub> "	95 (3 <sup>3</sup> / <sub>8</sub> "
ISA spindle taper with catcher	ins.		2 <sup>3</sup> / <sub>4</sub>	2 <sup>3</sup> / <sub>4</sub>
Rapid table traverse in both directions:				
	longitudinal	mm. min.	2500 (8'2 <sup>13</sup> / <sub>32</sub> "	2500 (8'2 <sup>13</sup> / <sub>32</sub> "
	transversal	mm./min.	1900 (6'2 <sup>13</sup> / <sub>16</sub> "	1900 (6'2 <sup>13</sup> / <sub>16</sub> "
	vertical	mm./min.	1250 (4'1 <sup>3</sup> / <sub>16</sub> "	1250 (4'1 <sup>3</sup> / <sub>16</sub> "
Speed of driving pulley	r. p. m.		600	600
Motor power	kW.		4.5 (6.1 H.P.)	7 (9.5 H.P.)
Motor speed	r. p. m.		1500	1500

Model			2 FYA	4 FYA
21 spindle speeds	r. p. m.		20-1500	18-1300
32 table feeds:				
	longitudinal	mm./min.	12-1010 (1 <sup>1</sup> / <sub>32</sub> "-3'3 <sup>3</sup> / <sub>4</sub> "	12-1010 (1 <sup>1</sup> / <sub>32</sub> "-3'3 <sup>3</sup> / <sub>4</sub> "
	transversal	mm./min.	9-756 (3 <sup>1</sup> / <sub>8</sub> "-2'5 <sup>1</sup> / <sub>4</sub> "	9-756 (3 <sup>1</sup> / <sub>8</sub> "-2'5 <sup>1</sup> / <sub>4</sub> "
	vertical	mm./min.	6-505 (1 <sup>1</sup> / <sub>4</sub> "-1'7 <sup>1</sup> / <sub>8</sub> "	6-505 (1 <sup>1</sup> / <sub>4</sub> "-1'7 <sup>1</sup> / <sub>8</sub> "
Approx. weight of machine	kgs.		4000 (8818 lbs.)	4940 (10891 lbs.)

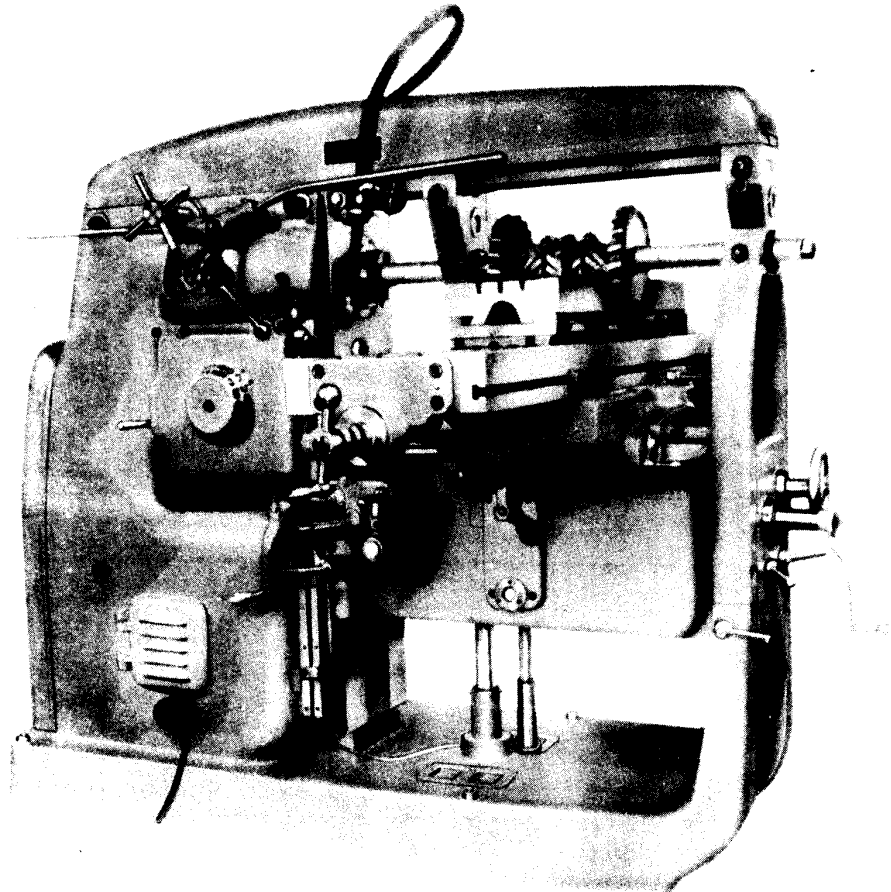
### Overall dimensions



Model		a	b	c	h
2 FYA	mm.	1815 (71 <sup>7</sup> / <sub>16</sub> "	2515 (98"	1950 (77 <sup>11</sup> / <sub>16</sub> "	1950 (77 <sup>11</sup> / <sub>16</sub> "
4 FYA	mm.	2485 (97 <sup>23</sup> / <sub>64</sub> "	3550 (139 <sup>1</sup> / <sub>4</sub> "	2350 (92 <sup>1</sup> / <sub>2</sub> "	2150 (84 <sup>3</sup> / <sub>8</sub> "

# Horizontal Milling Machines

High-speed models with  
increased speed range  
2 FXA, 4 FXA



## Standard equipment

- |   |                          |
|---|--------------------------|
| 1 coolant pump with piping                        | 2 arbor steadies         |
| 1 cutter arbor, 40 mm. (1 1/2") dia., with bushes | 1 pair of arbor supports |
| 1 clamping screw with nut                         | 1 set of spanners        |

## Special equipment (at extra charge)

### Recommended

- 1) Standard dividing head Fc
- 2) Swivel vice Fp

### Additional

- 1) Hand-driven rotary table Fe
- 2) Power-driven rotary table (both tables to be ordered with Fk milling head only) Fd
- 3) Rotary table indexing attachment Ff
- 4) Universal dividing head Fa
- 5) Universal dividing head with increased dividing range (to be ordered with milling head Ff only) Fb

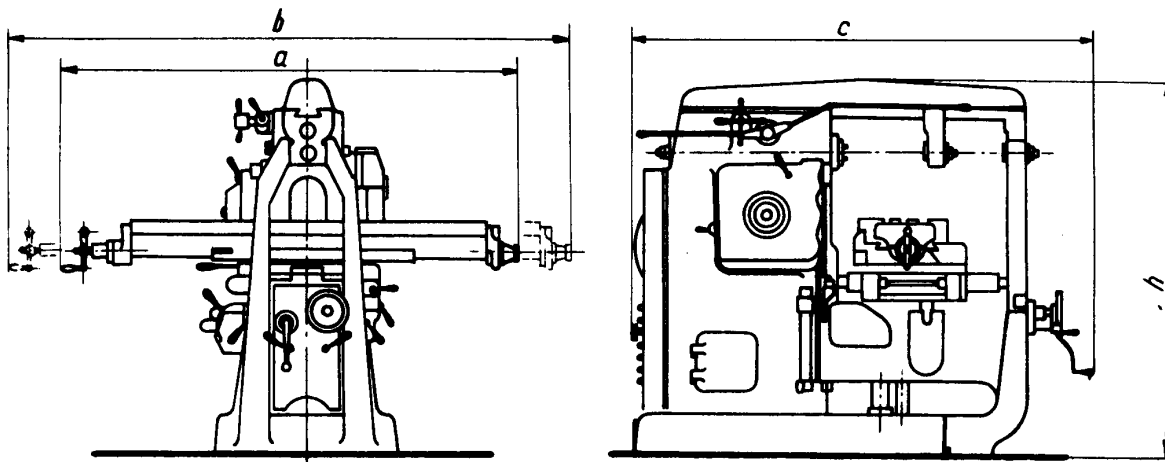
- 6) Vertical and oblique milling head Fk
- 7) Universal oblique milling head Fl
- 8) Change gear box (to be ordered with universal dividing head Fa and universal milling head Ff only) Fu
- 9) Universal vice Fr
- 10) Plain vice Fs
- 11) Cutter arbors, 22, 27 and 32 mm. (7/8", 1", and 1 1/4" dia. with set of bushes
- 12) Reducing sleeves
- 13) Front crank-handle

### Specification of Horizontal Milling Machines

Model		2 FXA	4 FXA
Table working surface	mm.	310 × 1250 (1'3 <sup>13</sup> / <sub>16</sub> " × 4'1 <sup>13</sup> / <sub>16</sub> "	410 × 1900 (1'4 <sup>1</sup> / <sub>8</sub> " × 6'2 <sup>13</sup> / <sub>16</sub> "
Table total surface	mm.	310 × 1350 (1'3 <sup>13</sup> / <sub>16</sub> " × 4'5 <sup>5</sup> / <sub>32</sub> "	410 × 2000 (1'4 <sup>1</sup> / <sub>8</sub> " × 6'6 <sup>3</sup> / <sub>4</sub> "
Number of table grooves		3	3
Width of table groove	mm.	18 (1 <sup>15</sup> / <sub>64</sub> "	18 (1 <sup>15</sup> / <sub>64</sub> "
Table traverse:			
longitudinal	mm.	700 (2'3 <sup>9</sup> / <sub>16</sub> "	1065 (3'5 <sup>15</sup> / <sub>16</sub> "
transversal	mm.	250 (9 <sup>27</sup> / <sub>32</sub> "	360 (1'2 <sup>5</sup> / <sub>32</sub> "
vertical	mm.	440 (1'5 <sup>1</sup> / <sub>2</sub> "	460 (1'6 <sup>1</sup> / <sub>8</sub> "
Maximum distance spindle axis to table	mm.	450 (1'5 <sup>15</sup> / <sub>64</sub> "	470 (1'6 <sup>1</sup> / <sub>8</sub> "
Distance spindle axis to over-arm	mm.	155 (6"	190 (7 <sup>15</sup> / <sub>32</sub> "
Maximum distance column to arbor support	mm.	785 (2'6 <sup>29</sup> / <sub>32</sub> "	980 (3'2 <sup>19</sup> / <sub>32</sub> "
Spindle diameter in front bearing	mm.	95 (3 <sup>3</sup> / <sub>8</sub> "	95 (3 <sup>3</sup> / <sub>8</sub> "
ISA spindle taper	ins.	2 <sup>3</sup> / <sub>4</sub>	2 <sup>3</sup> / <sub>4</sub>
Rapid traverse in both directions:			
longitudinal	mm./min.	2500 (8'2 <sup>13</sup> / <sub>32</sub> "	2500 (8'2 <sup>13</sup> / <sub>32</sub> "
transversal	mm./min.	1900 (6'2 <sup>13</sup> / <sub>16</sub> "	1900 (6'2 <sup>13</sup> / <sub>16</sub> "
vertical	mm./min.	1250 (4'1 <sup>3</sup> / <sub>16</sub> "	1250 (4'1 <sup>3</sup> / <sub>16</sub> "
Speed of driving pulley	r. p. m.	600	600
Motor power	kW.	4.5 (6.1 H.P.)	7 (9.5 H.P.)
Motor speed	r. p. m.	1500	1500

Model		2 FXA	4 FXA
21 spindle speeds	r. p. m.	20-1500	18-1500
32 table feeds:			
longitudinal	mm./min.	12-1010 (1 <sup>15</sup> / <sub>32</sub> "-3'3 <sup>3</sup> / <sub>4</sub> "	12-1010 (1 <sup>15</sup> / <sub>32</sub> "-3'3 <sup>3</sup> / <sub>4</sub> "
transversal	mm./min.	9-756 (3 <sup>3</sup> / <sub>8</sub> "-2'5 <sup>3</sup> / <sub>4</sub> "	9-756 (3 <sup>3</sup> / <sub>8</sub> "-2'5 <sup>3</sup> / <sub>4</sub> "
vertical	mm./min.	6-505 (1 <sup>1</sup> / <sub>4</sub> "-1'7 <sup>7</sup> / <sub>8</sub> "	6-505 (1 <sup>1</sup> / <sub>4</sub> "-1'7 <sup>7</sup> / <sub>8</sub> "
Approx. weight of machine	kgs.	3650 (8047 lbs.)	4940 (10891 lbs.)

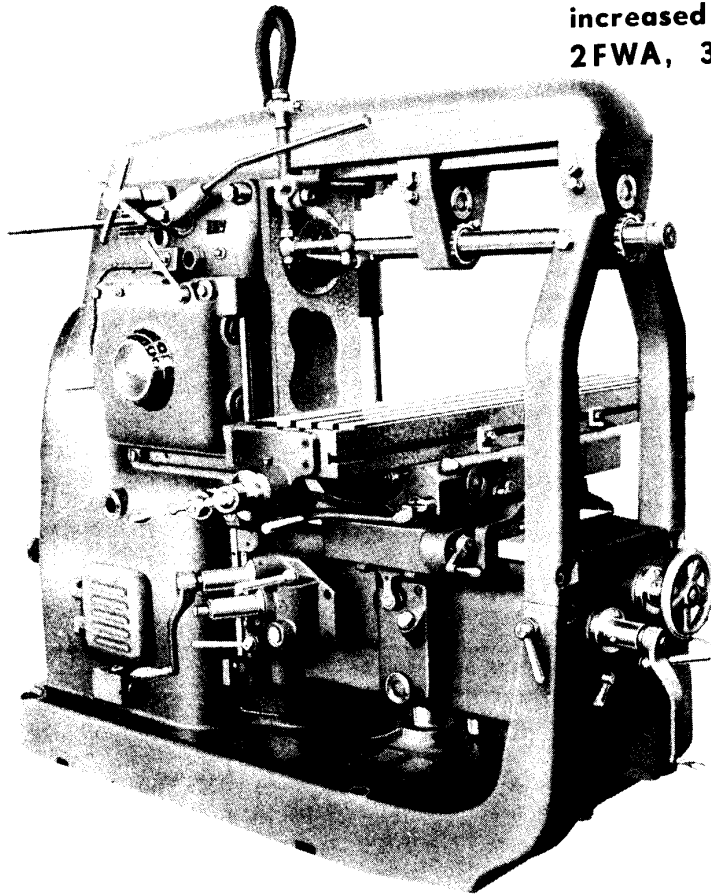
### Overall dimensions



Model		a	b	c	h
2 FXA	mm.	1815 (71 <sup>7</sup> / <sub>16</sub> "	2515 (98"	1985 (78 <sup>3</sup> / <sub>32</sub> "	1665 (65 <sup>9</sup> / <sub>16</sub> "
4 FXA	mm.	2485 (97 <sup>23</sup> / <sub>64</sub> "	3550 (139 <sup>3</sup> / <sub>4</sub> "	2350 (92 <sup>1</sup> / <sub>2</sub> "	1835 (72 <sup>3</sup> / <sub>16</sub> "

# Universal Milling Machines

High-speed models with  
increased speed range  
2FWA, 3FWA, 4FWA



The general merits, common to all our milling machines built of standardized interchangeable components, have already been described. They equally apply to the FWA universal milling machines. The table of these machines can be swivelled, this arrangement making it possible to perform, while using a universal dividing head, the most varied milling jobs. The table can swivel through any angle up to 45°, strictly to scale.

## Standard equipment

- |  |                          |
|--|--------------------------|
| 1 coolant pump with piping                     | 2 arbor steadies         |
| 1 cutter arbor, 40 mm. (1½") dia., with bushes | 1 pair of arbor supports |
| 1 clamping screw with nut                      | 1 set of spanners        |

## Special equipment (at extra charge)

### Recommended

- |   |    |
|---|----|
| 1) Universal dividing head  | Fa |
| 2) Change gear box (to be ordered with universal dividing head Fa only) | Fu |
| 3) Universal vice   | Fr |
| 4) Swivel vice  | Fp |

### Additional

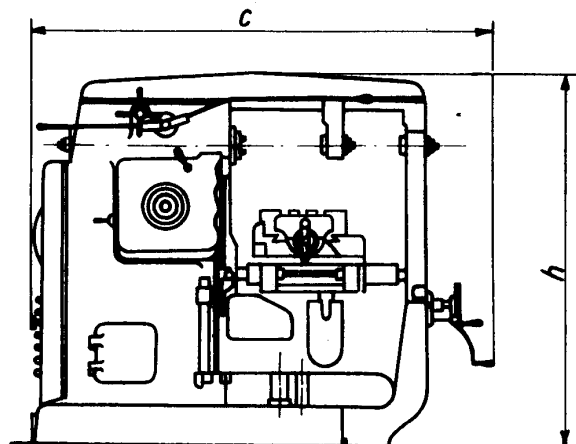
- |  |    |
|--|----|
| 1) Hand-driven rotary table  | Fe |
| 2) Power-driven rotary table (both tables to be ordered with milling head Fk only) | Fd |
| 3) Rotary table indexing attachment  | Ft |

- |   |    |
|---|----|
| 4) Universal dividing head with increased dividing range (instead of the Universal dividing head Fa)            | Fb |
| 5) Vertical and oblique milling head  | Fk |
| 6) Universal oblique milling head   | Fl |
| 7) Plain vice   | Fs |
| 8) Clamping device (for universal dividing head Fa or universal dividing head with increased dividing range Fb) | Fw |
| 9) Universal vice   | Fr |
| 10) Cutter arbors 22, 27, 32 mm. (7/8", 1", 1¼") dia. with set of bushes  |    |
| 11) Reducing sleeves  |    |

**Specification of Universal Milling Machines**

Model		2 FWA	3 FWA	4 FWA
Table working surface	mm.	310 × 1250 (1'3 <sup>3</sup> / <sub>16</sub> " × 4'13 <sup>3</sup> / <sub>16</sub> "	390 × 1500 (1'3 <sup>3</sup> / <sub>8</sub> " × 4'11 <sup>1</sup> / <sub>16</sub> "	410 × 1900 (1'4 <sup>1</sup> / <sub>8</sub> " × 6'2 <sup>13</sup> / <sub>16</sub> "
Table total surface	mm.	310 × 1350 (1'3 <sup>3</sup> / <sub>16</sub> " × 4'5 <sup>3</sup> / <sub>32</sub> "	390 × 1600 (1'3 <sup>3</sup> / <sub>8</sub> " × 5'3"	410 × 2000 (1'4 <sup>1</sup> / <sub>8</sub> " × 6'6 <sup>3</sup> / <sub>4</sub> "
Number of table grooves		3	3	3
Width of table groove	mm.	18 (4 <sup>5</sup> / <sub>64</sub> "	18 (4 <sup>5</sup> / <sub>64</sub> "	18 (4 <sup>5</sup> / <sub>64</sub> "
Table traverse:				
longitudinal	mm.	700 (2'3 <sup>0</sup> / <sub>16</sub> "	865 (2'10 <sup>1</sup> / <sub>16</sub> "	1065 (3'5 <sup>13</sup> / <sub>16</sub> "
transversal	mm.	250 (9 <sup>27</sup> / <sub>32</sub> "	300 (11 <sup>13</sup> / <sub>16</sub> "	360 (1'2 <sup>3</sup> / <sub>32</sub> "
vertical	mm.	410 (1'4 <sup>1</sup> / <sub>8</sub> "	440 (1'5 <sup>5</sup> / <sub>16</sub> "	440 (1'5 <sup>5</sup> / <sub>16</sub> "
Table maximum swivel angle		45°	45°	45°
Maximum distance spindle axis to table	mm.	420 (1'4 <sup>17</sup> / <sub>32</sub> "	450 (1'5 <sup>15</sup> / <sub>64</sub> "	450 (1'5 <sup>15</sup> / <sub>64</sub> "
Distance spindle axis to over-arm	mm.	155 (6"	190 (7 <sup>15</sup> / <sub>32</sub> "	190 (7 <sup>15</sup> / <sub>32</sub> "
Maximum distance column to arbor support	mm.	785 (2'6 <sup>29</sup> / <sub>32</sub> "	865 (2'10"	980 (3'2 <sup>19</sup> / <sub>32</sub> "
Spindle diameter in front bearing	mm.	95 (3 <sup>3</sup> / <sub>8</sub> "	95 (3 <sup>3</sup> / <sub>8</sub> "	95 (3 <sup>3</sup> / <sub>8</sub> "
ISA spindle taper	ins.	2 <sup>3</sup> / <sub>4</sub>	2 <sup>3</sup> / <sub>4</sub>	2 <sup>3</sup> / <sub>4</sub>
Rapid traverse in both directions:				
longitudinal	mm./min.	2500 (8'2 <sup>13</sup> / <sub>32</sub> "	2500 (8'2 <sup>13</sup> / <sub>32</sub> "	2500 (8'2 <sup>13</sup> / <sub>32</sub> "
transversal	mm./min.	1900 (6'2 <sup>13</sup> / <sub>16</sub> "	1900 (6'2 <sup>13</sup> / <sub>16</sub> "	1900 (6'2 <sup>13</sup> / <sub>16</sub> "
vertical	mm./min.	1250 (4'1 <sup>3</sup> / <sub>16</sub> "	1250 (4'1 <sup>3</sup> / <sub>16</sub> "	1250 (4'1 <sup>3</sup> / <sub>16</sub> "
Driving pulley speed	r. p. m.	600	600	600
Motor power	kW.	4.5 (6.1 H.P.)	7 (9.5 H.P.)	7 (9.5 H.P.)
Motor speed	r. p. m.	1500	1500	1500

Model		2 FWA	3 FWA	4 FWA
21 spindle speeds	r. p. m.	20-1500	18-1500	18-1500
32 table feeds:				
longitudinal	mm./min.	12-1010 (1 <sup>5</sup> / <sub>32</sub> "-3'3 <sup>3</sup> / <sub>4</sub> "	12-1010 (1 <sup>5</sup> / <sub>32</sub> "-3'3 <sup>3</sup> / <sub>4</sub> "	12-1010 (1 <sup>5</sup> / <sub>32</sub> "-3'3 <sup>3</sup> / <sub>4</sub> "
transversal	mm./min.	9-756 (3 <sup>3</sup> / <sub>8</sub> "-2'5 <sup>3</sup> / <sub>4</sub> "	9-756 (3 <sup>3</sup> / <sub>8</sub> "-2'5 <sup>3</sup> / <sub>4</sub> "	9-756 (3 <sup>3</sup> / <sub>8</sub> "-2'5 <sup>3</sup> / <sub>4</sub> "
vertical	mm./min.	6-505 (1'4"-1'7 <sup>7</sup> / <sub>8</sub> "	6-505 (1'4"-1'7 <sup>7</sup> / <sub>8</sub> "	6-505 (1'4"-1'7 <sup>7</sup> / <sub>8</sub> "
Approx. weight of machine	kgs.	3750 (8267 lbs.)	4365 (9623 lbs.)	5040 (11111 lbs.)

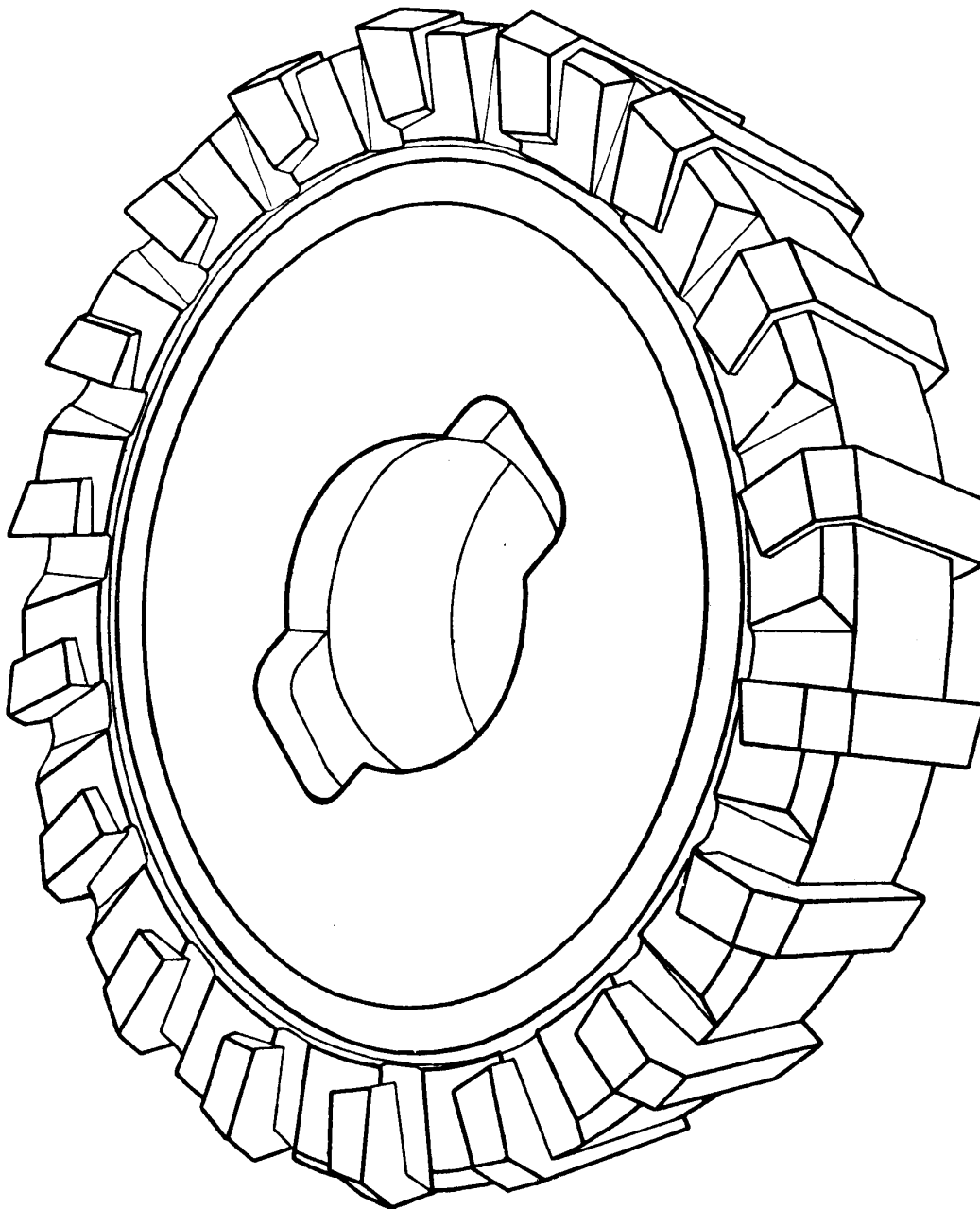
**Overall dimensions**

Model		a	b	c	h
2 FWA	mm.	1815 (71 <sup>7</sup> / <sub>16</sub> "	2515 (98"	1985 (78 <sup>3</sup> / <sub>32</sub> "	1665 (65 <sup>9</sup> / <sub>16</sub> "
3 FWA	mm.	2050 (80 <sup>31</sup> / <sub>64</sub> "	2915 (114 <sup>3</sup> / <sub>4</sub> "	2155 (84 <sup>27</sup> / <sub>32</sub> "	1835 (72 <sup>3</sup> / <sub>16</sub> "
4 FWA	mm.	2485 (97 <sup>23</sup> / <sub>64</sub> "	3550 (139 <sup>3</sup> / <sub>4</sub> "	2350 (92 <sup>1</sup> / <sub>2</sub> "	1835 (72 <sup>3</sup> / <sub>16</sub> "

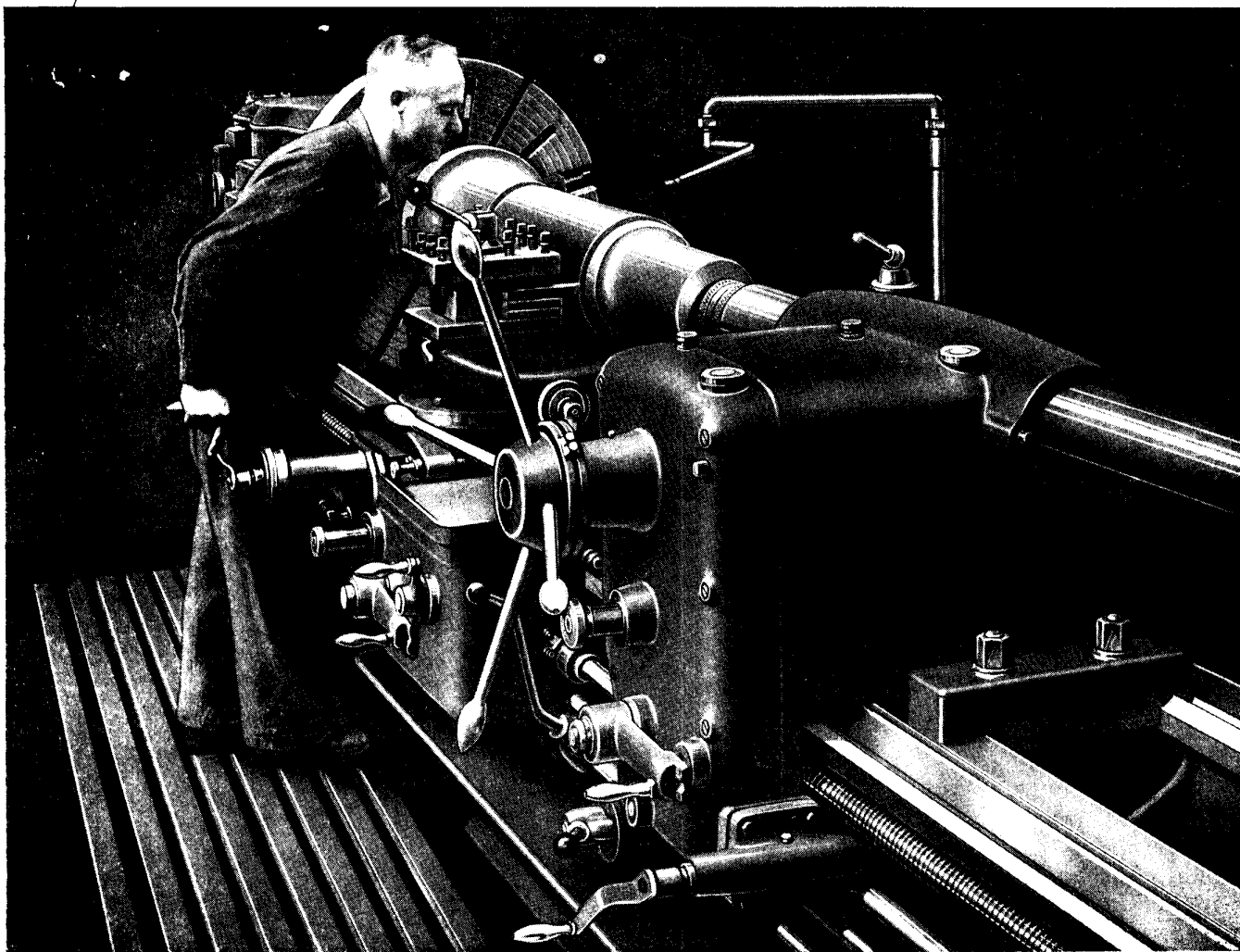


The machines are supplied complete with driving motor and electric equipment (Please specify kind of current and Voltage).  
Supply of the special equipment should be agreed upon with the customers when ordering.

British equivalents are approximate only



*Subject to minor alterations in dimensions and design*



# HIGH-SPEED LATHES

TYPE TR-45, 55, 70, 90 and 100

SOLE EXPORTERS



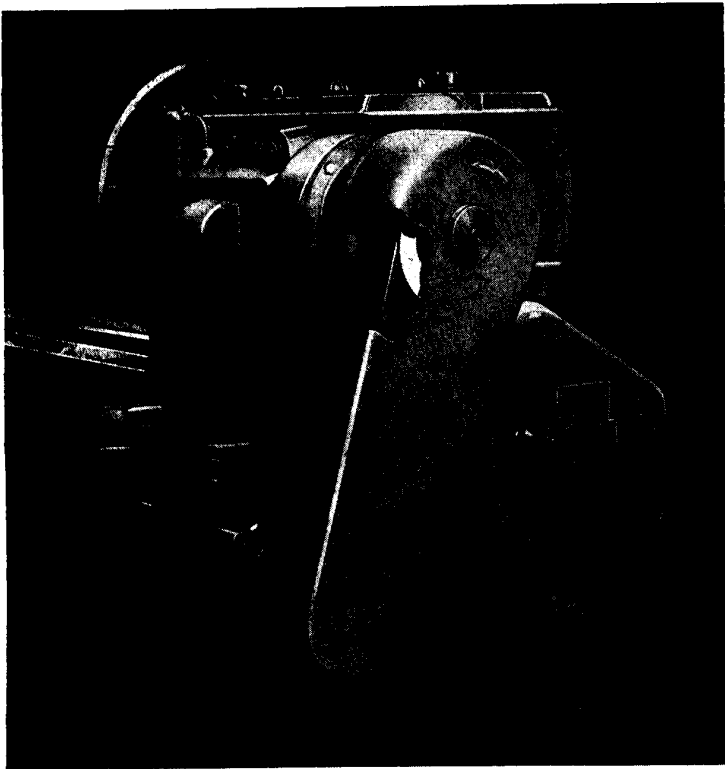
**METALEX**

POLAND, WARSZAWA, P. O. BOX. 442

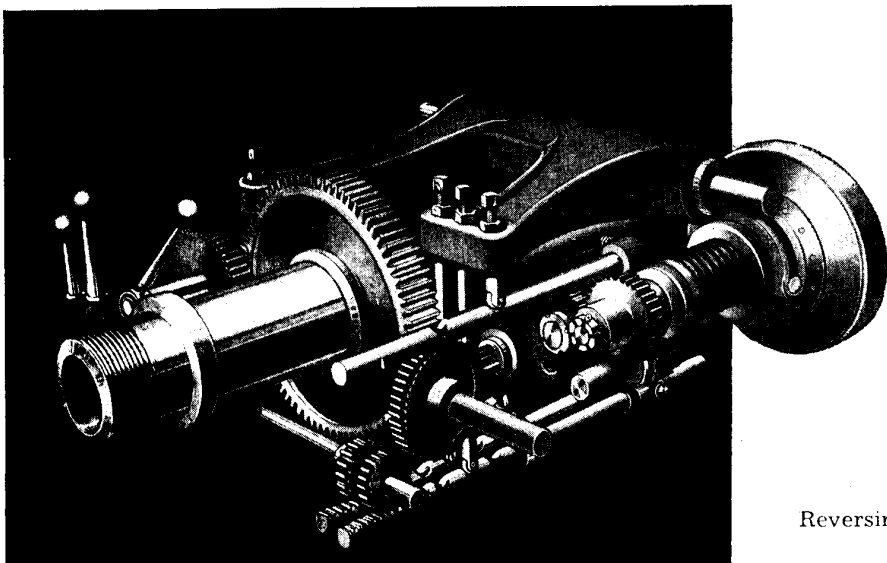
TELEGRAMS: METALEX - WARSZAWA

## High-Speed Lathes, Type TR 45, 55, 70, 90 and 100

These high-speed lathes are outstanding in so far as ease and convenience of operations are concerned, as well as for their high efficiency in cutting of large-section chips by means of high-speed steel or carbide-tipped tools. A wide range of spindle speeds, the ease with which the most economic cutting speeds are selected, the rapidity with which the lathe can be started and the direction of the rotation of the spindle reversed, as well as the provision of a substantial range of special fittings — all these are features rendering our high-speed lathes unique for all classes of turning work, as well as for screw-cutting.



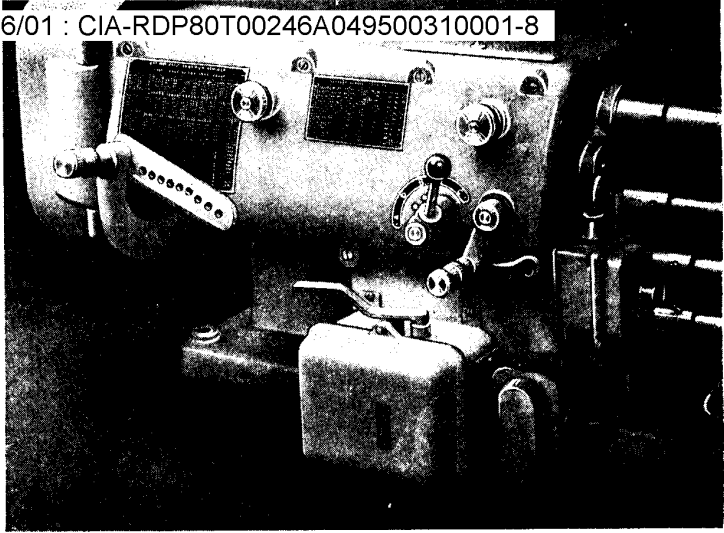
THE DRIVE is obtained from an electric motor mounted on the lathe stand on which it can be adjusted. The drive is transmitted by means of V-belts to the headstock, giving 18 different speed rates. Three levers, placed in one axis, serve for changing the spindle speed. The reversing of the rotation of the spindle is obtained by means of a lever fixed on the saddle, the speed of rotation in the left-hand direction being 1.3 times greater than in the right-hand direction. On the lathe models TR-45, TR-55, TR-90 and TR-100 the spindle speeds can be reversed even during operation.



THE SPINDLE rests in adjustable taper bearings on cylindrical tenons. All other shafts of the headstock revolve in rolling bearings.

Reversing device

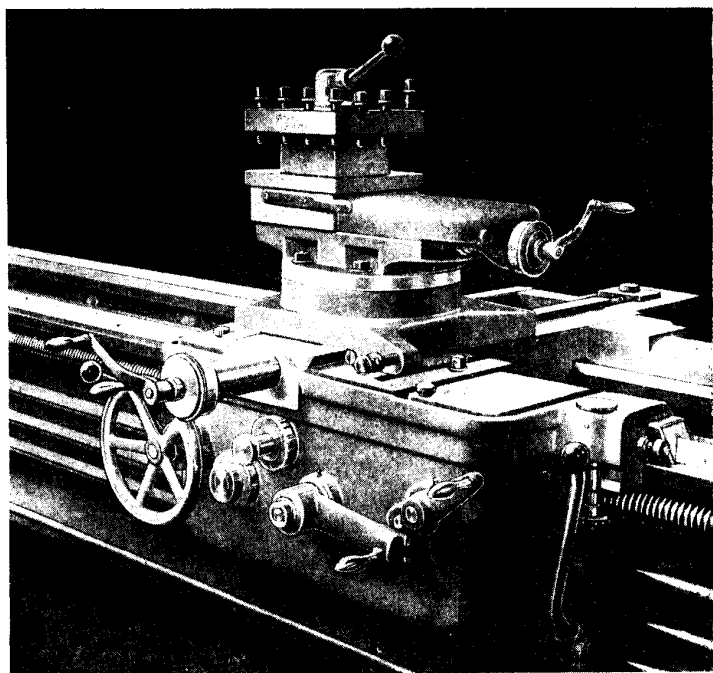
THE FEED BOX is driven from the headstock through a system of change-gears, giving 55 different feed rates and permitting to cut Metric, Module, Loewenherz, Circular Pitch, Inch, Diametral Pitch, special and steep threads.



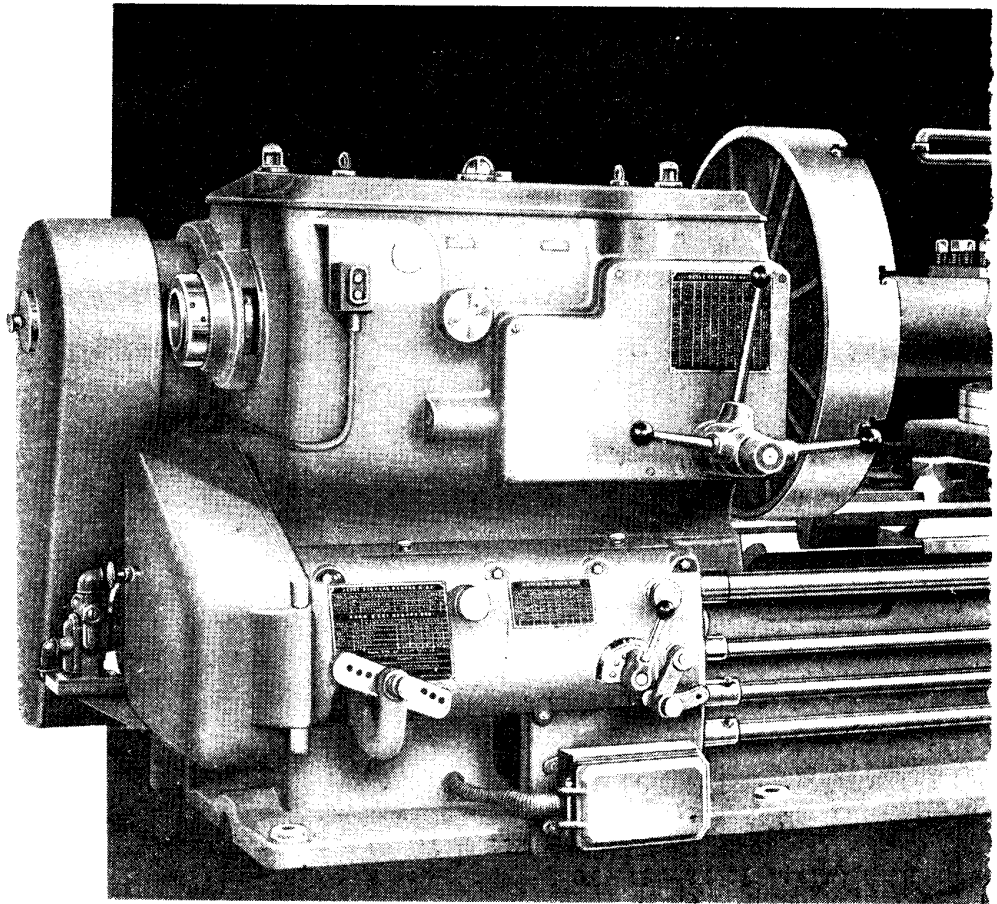
THE TAILSTOCK is arranged to slide, thus providing the possibility of machining tapers of small convergence.

THE SADDLE is made to slide by means of a lead screw and feed shaft. An overload clutch fitted in the saddle lock can be set to both fine chips (finisch turning) and coarse chips (roughing), thus permitting to operate with stop-dogs, for both saddle sliding motion and cross traverse. The quadruple tool-post is provided with a latch for locking it in the four main positions, and can also be set and locked in any position desired.

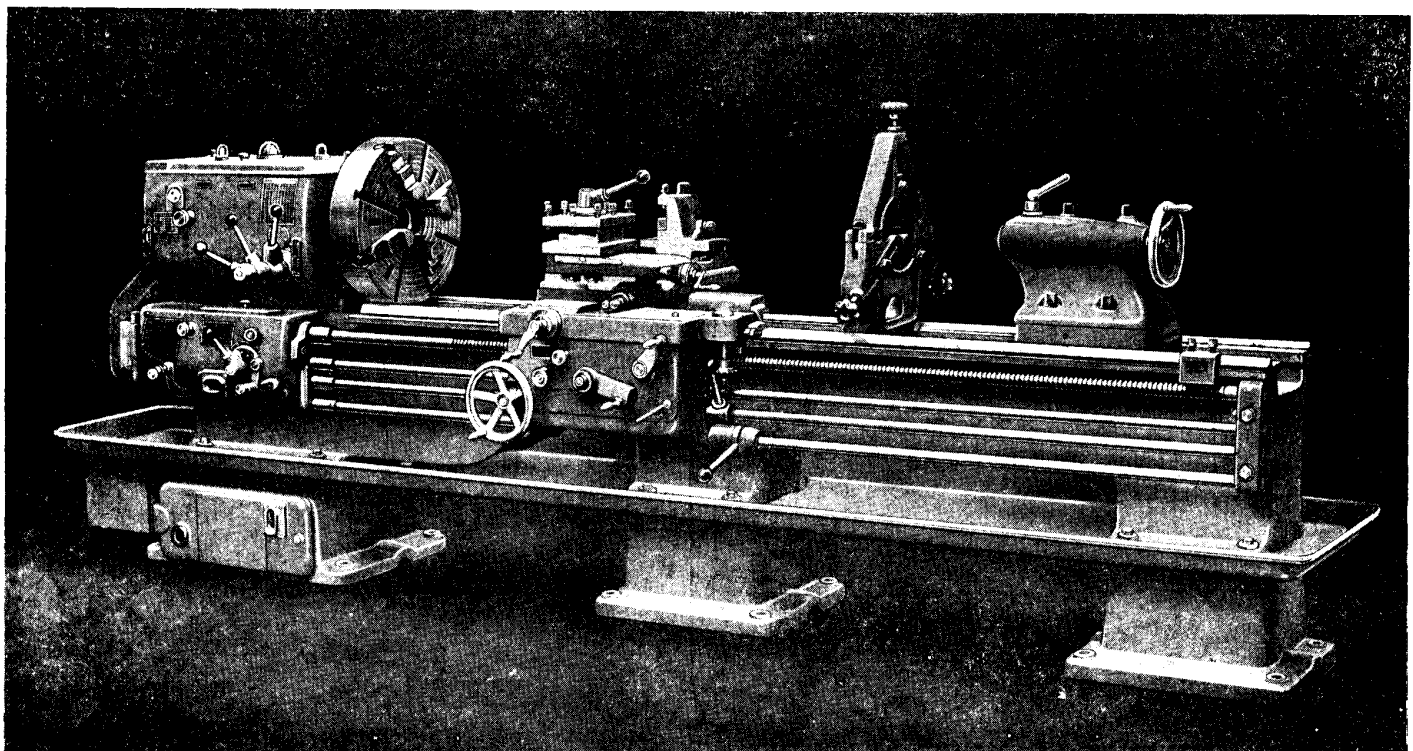
THE HEADSTOCK AND SPINDLE ARE LUBRICATED by means of a wing pump supplying the lubricant to a distributor. The operation of the lubricating pump can be inspected through a spyhole in the headstock cover.

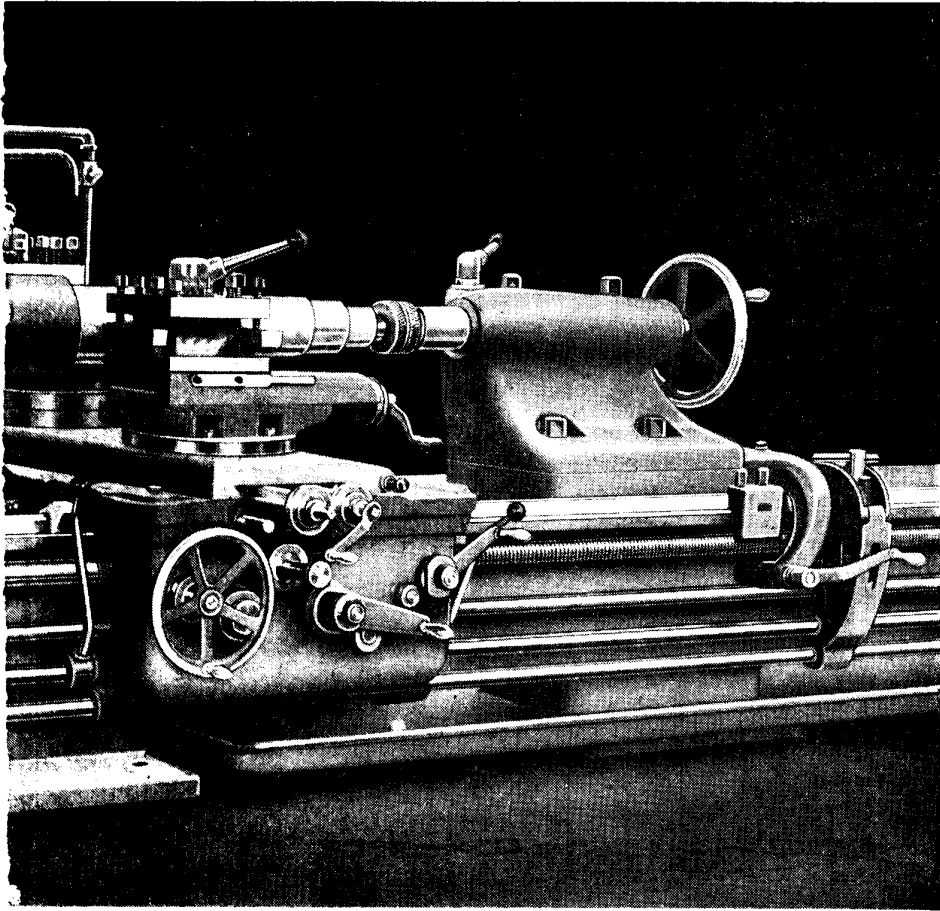


High-Speed Lathes TR-99  
and TR 100

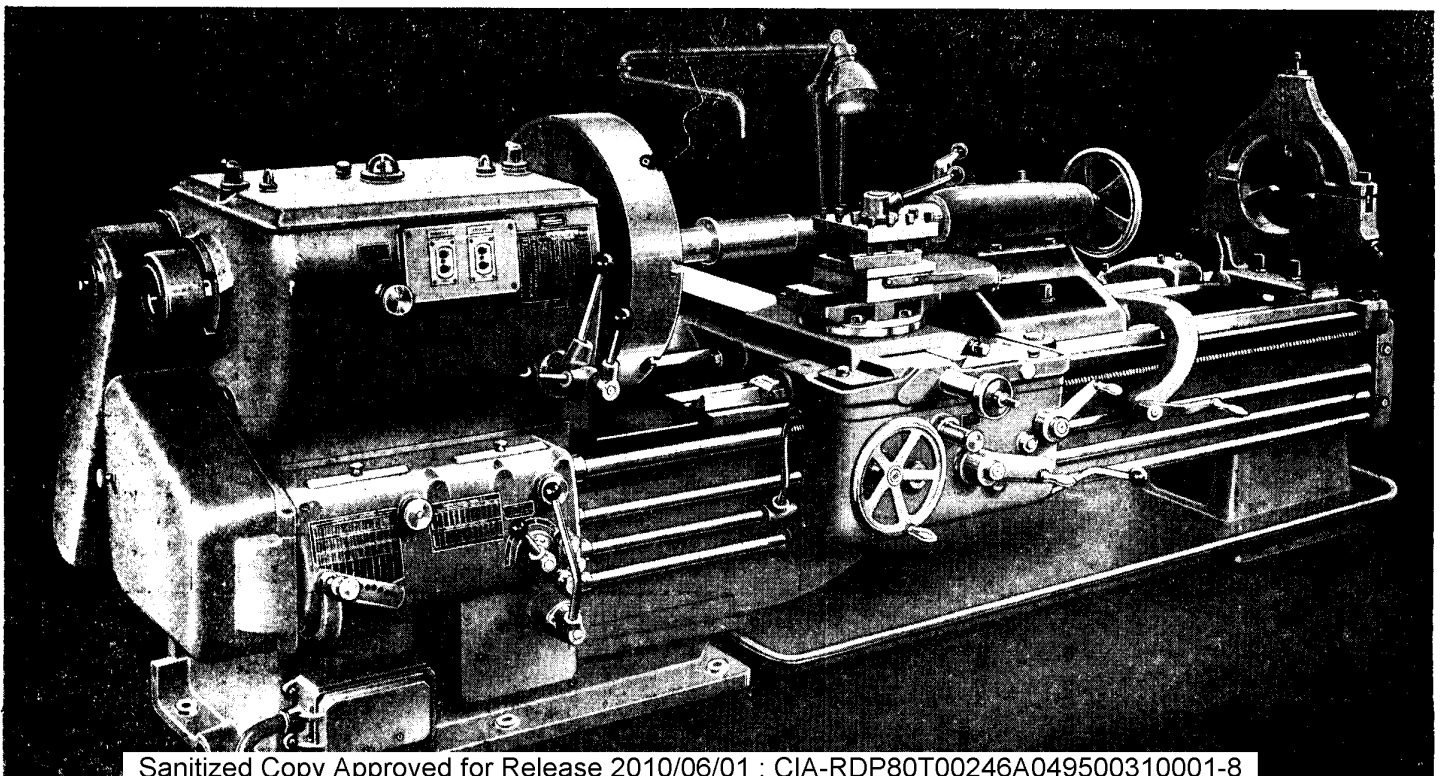


High-Speed Lathes TR-45 and TR-55





High-Speed Lathe TR-70



## Specification

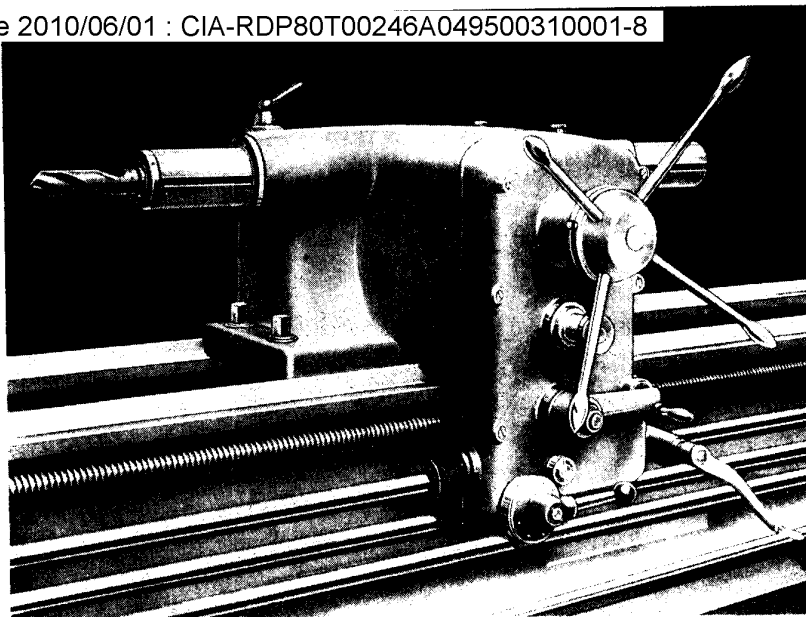
		M o d e l				
		TR-45	TR-55	TR-70	TR-90	TR-100
1. Diameter of work turned over bed	mm.	450	540	680	900	1000
	ins.	17 3/4	21 1/4	26 3/4	35 1/2	39 3/8
2. Diameter of work turned over saddle	mm.	300	320	420	570	680
	ins.	11 3/4	12 5/8	16 1/2	22 1/2	26 3/4
3. Diameter of work turned without bridge	mm.	615	700	960	1150	1250
	ins.	24 7/32	27 9/16	37 3/8	45 1/4	49 1/4
4. Length of work turned without bridge	mm.	200	210	350	390	390
	ins.	7 7/8	8 1/4	13 7/8	15 3/8	15 3/8
5. Height of centres over bed	mm.	215	265	335	435	490
	ins.	8 1/2	10 7/16	13 3/16	17 1/8	19 1/4
6. Hollow spindle	mm.	52	62	72	105	105
	ins.	2 1/8	2 1/2	2 7/8	4 1/8	4 1/8
7. Spindle taper -- metric	mm.	60	70	80	120	120
8. Centre taper -- Morse	No.	4	4	5	6	6
9. Diameter of 4-jaw chuck	mm.	390	490	630	800	800
	ins.	15 3/8	19 1/4	24 3/4	31 1/2	31 1/2
10. 18 spindle speeds	r. p. m.	19—960	12—600	12—600	7.5—380	7.5—380
11. Number of feed rates without exchanging gears		55	55	55	55	55
12. Range of longitudinal feed rates	mm.	0.08—2.5	0.09—2.7	0.13—4	0.13—4	0.13—4
	ins.	0.00314—0.00984	0.00354—0.1063	0.00512 — 0.15747		
13. Range of cross traverse rates	mm.	Half the longitudinal feed rates				
	ins.					
14. Metric screw pitch (55 variations)	mm.	0.25—7.5	0.5—15	0.5—15	0.5—15	0.5—15
15. Inch screw pitch (55 variations) T. P. I. threads		120—4	60—2	60—2	60—2	60—2
16. Power of main drive motor	H. P.	7.5	10	17	20	20
17. Speed of main drive motor	r. p. m.	1440	1440	1440	1440	1440

## Weights dependent on length turned

M o d e l	Admits between centres								
	1000 39 3/8"	1500 59 1/8"	2000 78 3/4"	2500 98 1/2"	3000 118 1/4"	3500 137 7/8"	4000 157 1/2"	5000 197"	6000 236 1/4"
	kg. lbs.								
TR-45	1850	2000	2200	—	—	—	—	—	—
	4070	4400	4840	—	—	—	—	—	—
TR-55	2200	2400	2700	2900	3100	3300	3400	—	—
	4840	5340	5930	6320	6820	7260	7500	—	—
TR-70	—	4700	4900	5100	5300	—	5700	6100	6500
	—	10350	10800	11250	11700	—	12580	13420	14300
TR-90	—	8000	8500	—	9500	10000	10500	11500	12500
	—	17600	18700	—	20900	22000	23100	25300	27500
TR-100	—	8200	8700	—	9700	10200	10700	11700	12700
	—	18060	19200	—	21400	22500	23700	25800	28000

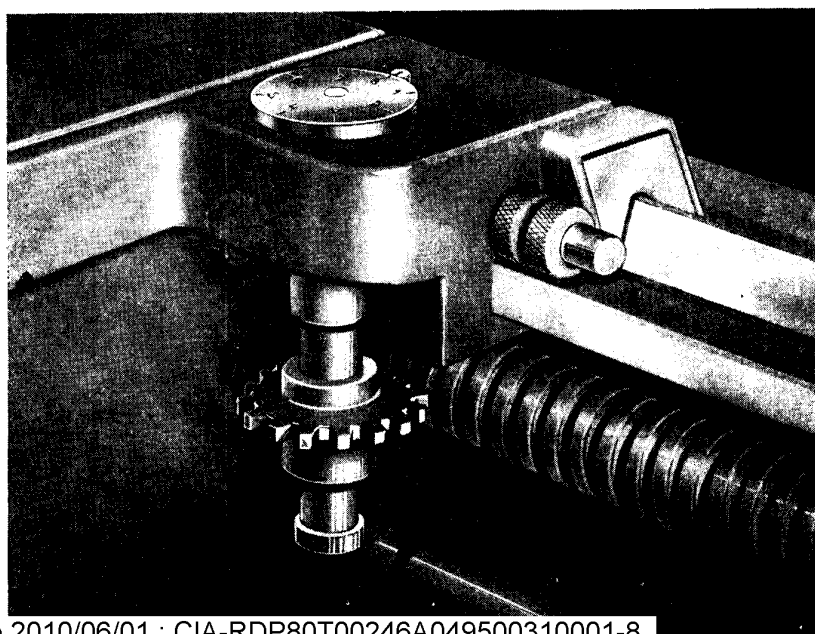
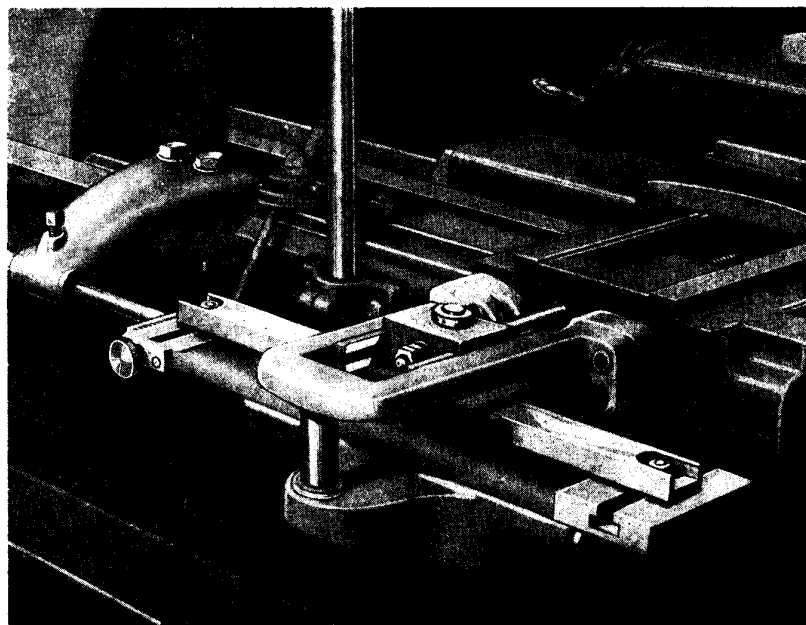
## Standart Equipment

1. Four-jaw chuck
2. Stationary steady rest, travelling steady rest
3. Driving plate
4. Change gears for metric and inch thread screw-cutting
5. Supporting brackets for lead-screw and shafts when turning work of greater length (only for Models TR-90 and TR-100)
6. Reduction sleeve for spindle
7. Auxiliary lathe mandrel
8. Two stop dogs
9. Two fixed centres
10. Set of spanners and crank handles

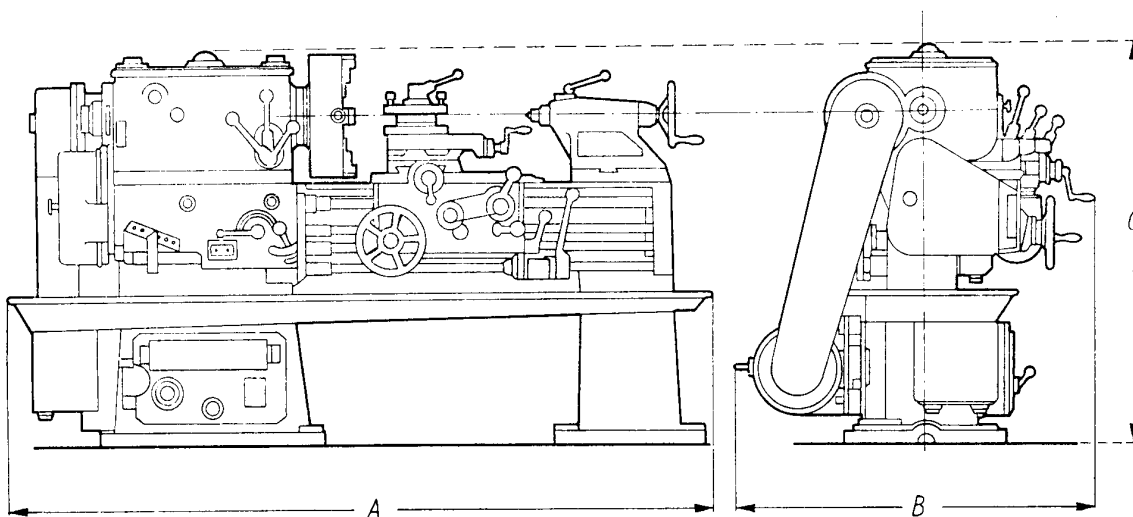


## Special Equipment at extra charge

1. Bed gap with bridge
2. Double slide rest with two separate top slide rests and square tool posts for Models TR-70, TR-90 and TR-100
3. Extended cross slide of the slide rests with additional rear tool post for Models TR-45 and TR-55
4. Drilling tailstock to be applied only:
  - a) In Lathes type TR-55 with distance between centres over 2500 mm., the max. drilling length by means of tailstock spindle being 500 mm.
  - b) In Lathes type TR-70 with distance between centres over 3000 mm., the max. drilling length by means of tailstock spindle being 800 mm.
  - c) In Lathes type TR-90 with distance between centres over 3000 mm., the max. drilling length by means of tailstock spindle being 1000 mm.
5. Graduated rule for turning tapers with a convergence up to 10"
6. Dial thread gauge
7. Change gears for module and special threads
8. Self-centring chuck plate
9. Foundation bolts and washers







Subject to minor modifications in design

Model	Admits between centres								
	mm. ins.								
	1000	1500	2000	2500	3000	3500	4000	5000	6000
	39 3/8"	59 1/8"	78 3/4"	98 1/2"	113 1/4"	137 7/8"	157 1/2"	197"	236 1/4"
TR-45	A	2760	3260	3760	4260	4760	—	—	—
		108 3/4"	128 1/2"	148 1/8"	168 3/4"	187 1/8"	—	—	—
	B	1230	1230	1230	1230	1230	—	—	—
		48 7/16"	48 7/16"	48 7/16"	48 7/16"	48 7/16"	—	—	—
TR-55	C	1200	1200	1200	1200	1200	—	—	—
		47 1/4"	47 1/4"	47 1/4"	47 1/4"	47 1/4"	—	—	—
	A	3100	3350	4100	4600	5100	5600	6100	—
		122 1/8"	132"	160 1/8"	181 1/4"	200 7/8"	220 1/2"	240 1/8"	—
TR-70	B	1320	1320	1320	1320	1320	1320	1320	—
		52"	52"	52"	52"	52"	52"	52"	—
	C	1300	1300	1300	1300	1300	1300	1300	—
		51 1/4"	51 1/4"	51 1/4"	51 1/4"	51 1/4"	51 1/4"	51 1/4"	—
TR-90	A	—	3700	4220	4720	5220	—	6220	7220
		—	145 3/4"	166 1/8"	185 3/4"	205 3/8"	—	244 3/4"	284 1/8"
	B	—	1710	1710	1710	1710	—	1710	1710
		—	67 3/8"	67 3/8"	67 3/8"	67 3/8"	—	67 3/8"	67 3/8"
TR-100	C	—	1320	1320	1320	1320	—	1320	1320
		—	52"	52"	52"	52"	—	52"	52"
	A	—	4610	5110	—	6110	6610	7110	8110
		—	181 5/8"	201 3/8"	—	241 1/8"	260 7/8"	280 5/8"	319 1/4"
TR-100	B	—	1885	1885	—	1885	1885	1885	1885
		—	74 1/4"	74 1/4"	—	74 1/4"	74 1/4"	74 1/4"	74 1/4"
	C	—	1375	1375	—	1375	1375	1375	1375
		—	54 1/8"	54 1/8"	—	54 1/8"	54 1/8"	54 1/8"	54 1/8"
TR-100	A	—	4610	5110	—	6110	6610	7110	8110
		—	181 5/8"	201 3/8"	—	241 1/8"	260 7/8"	280 5/8"	319 1/4"
	C	—	1885	1885	—	1885	1885	1885	1885
		—	74 1/4"	74 1/4"	—	74 1/4"	74 1/4"	74 1/4"	74 1/4"
TR-100	B	—	1430	1430	—	1430	1430	1430	1430
		—	56 1/4"	56 1/4"	—	56 1/4"	56 1/4"	56 1/4"	56 1/4"

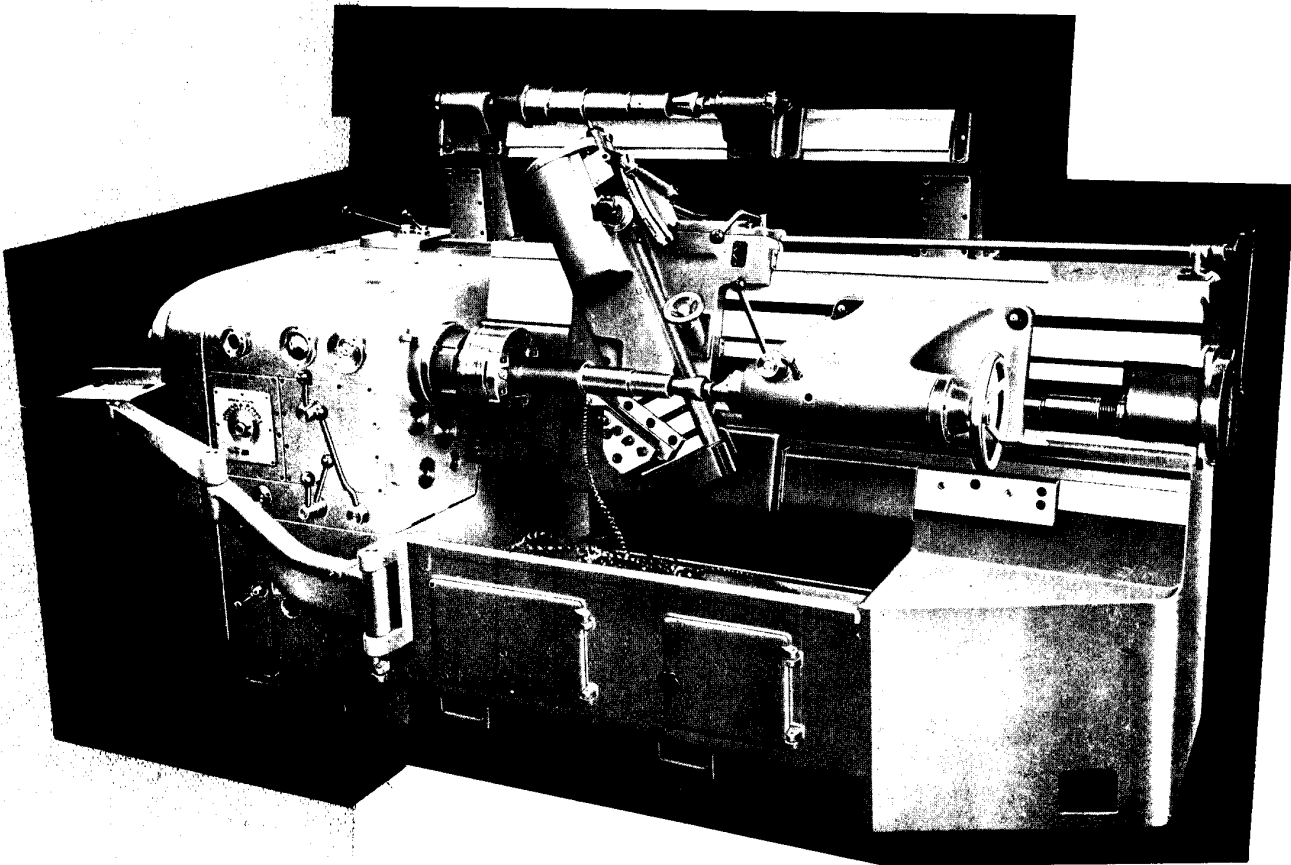
British equivalents are approximate only

POLISH FOREIGN TRADE PUBLICATIONS — WARSZAWA  
 Printed in Poland  
 in PŁA

2



# COPYING LATHE



# TGA-18

## METAEXPORT

# COPYING LATHE

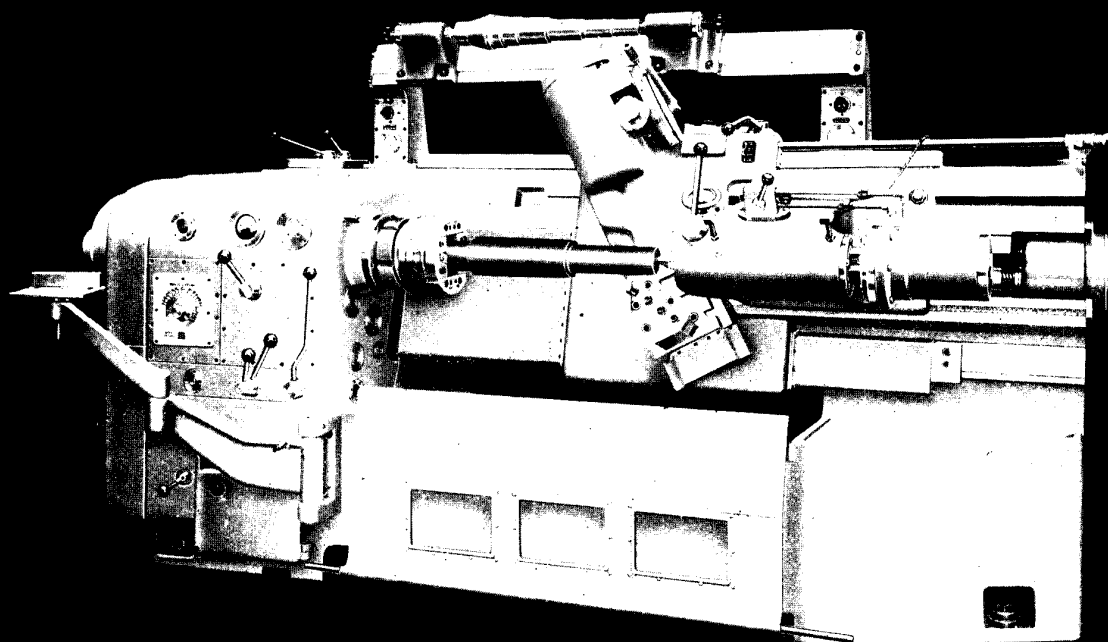
The TGA-18 Copying Lathe is designed for rough and finish turning to templet of stepped shafts 40 to 180 mm. (1 1/2 - 7 1/2 in.) dia. and up to 1000 mm. (39 3/8 in.) in length with carbide-tipped tools.

## OUTSTANDING FEATURES

When compared with standard copying lathes of other make, our TGA-18 type is remarkable for the following outstanding features:

1. Extremely rigid and sturdy design.
2. Powerful spindle drive.
3. Wide range of speeds which, jointly with the aforementioned properties affords full use of carbide-tipped tools with chip breakers.
4. Non-typical design of the machine providing fully free chip flow, and at the same time a convenient distribution of forces acting upon the guideways.
5. Hydraulic copying device enabling the reproduction of the templet shape with high accuracy by slight pressure of the tracer on the templet.
6. Ready operation owing to automatic feed cycle besides the copying attachment, and hydraulic approach and withdrawal of the tool.
7. Ready chucking of the work by means of the stock feeding appliance and self-clamping chuck, or of a pneumatic chuck and tailstock.
8. Easy access to the chuck, workpiece and tailstock owing to the spindle axis being located close to the machine front.
9. Complete safety owing to direct and ready discharge of chips, a special chip guard and arrangement of the control elements beyond the reach of chips.
10. Very simple and clear design.

Copying Lathe  
TGA-18  
with pneumatic  
tailstock pro-  
truder.



## DESIGN

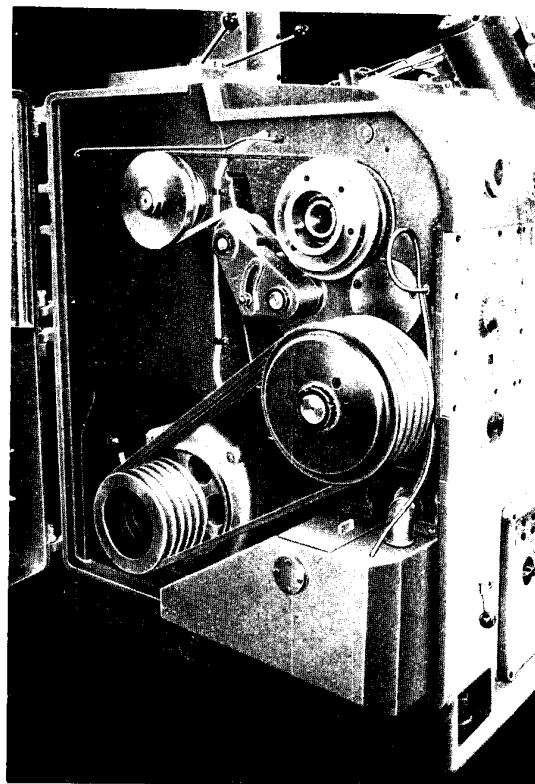
The general design of the TGA-18 Copying Lathe differs essentially from that of standard lathes.

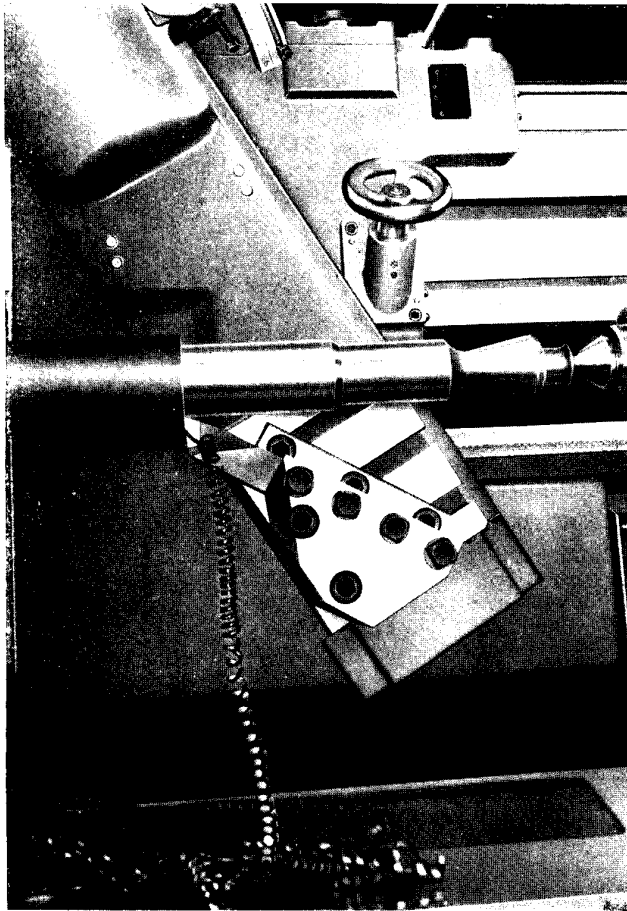
As the machine bed, in the form of a sturdy beam, is placed behind the workpiece, it was possible to execute it as an extremely rigid box casting without recesses for the discharge of chips.

The bed base makes a convenient chute for the chips to the rear of the machine, whence they can be easily removed without stopping work.

The base accommodates the main motor and all electric appliances, as well as the tank, motor, pump and filter feeding the hydraulic copying system. The bottom part of the base forms a coolant tank.

View of headstock drive





Slide rest in operation

The slide rest traversed along the bed ways by means of the lead screw is so designed that the tool is located below the workpiece, and all drive and control elements as well as the copying attachment — above it.

This arrangement ensures not only free chip flow and discharge, but also allows for location of the control elements and guideways out of reach of the chips.

In spite of such an arrangement the direction of forces arising from cutting and from the weight of the slide rest, acting upon the guideways is kept up. This feature ensures smooth and vibrationless work at high cutting speeds, while broken chips are produced.

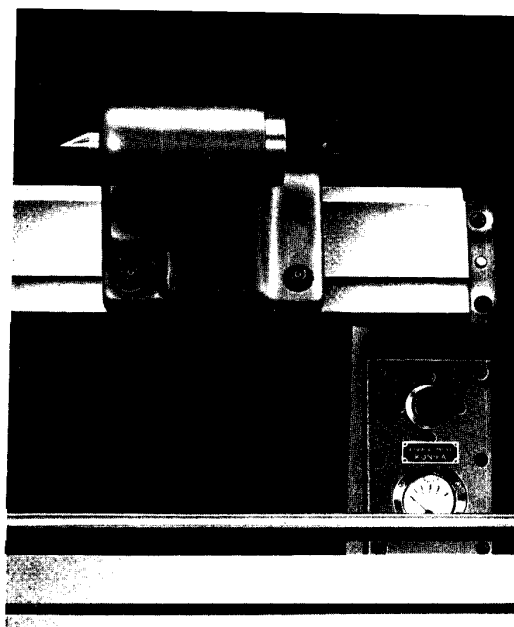
**Fixing (securing) the workpiece**

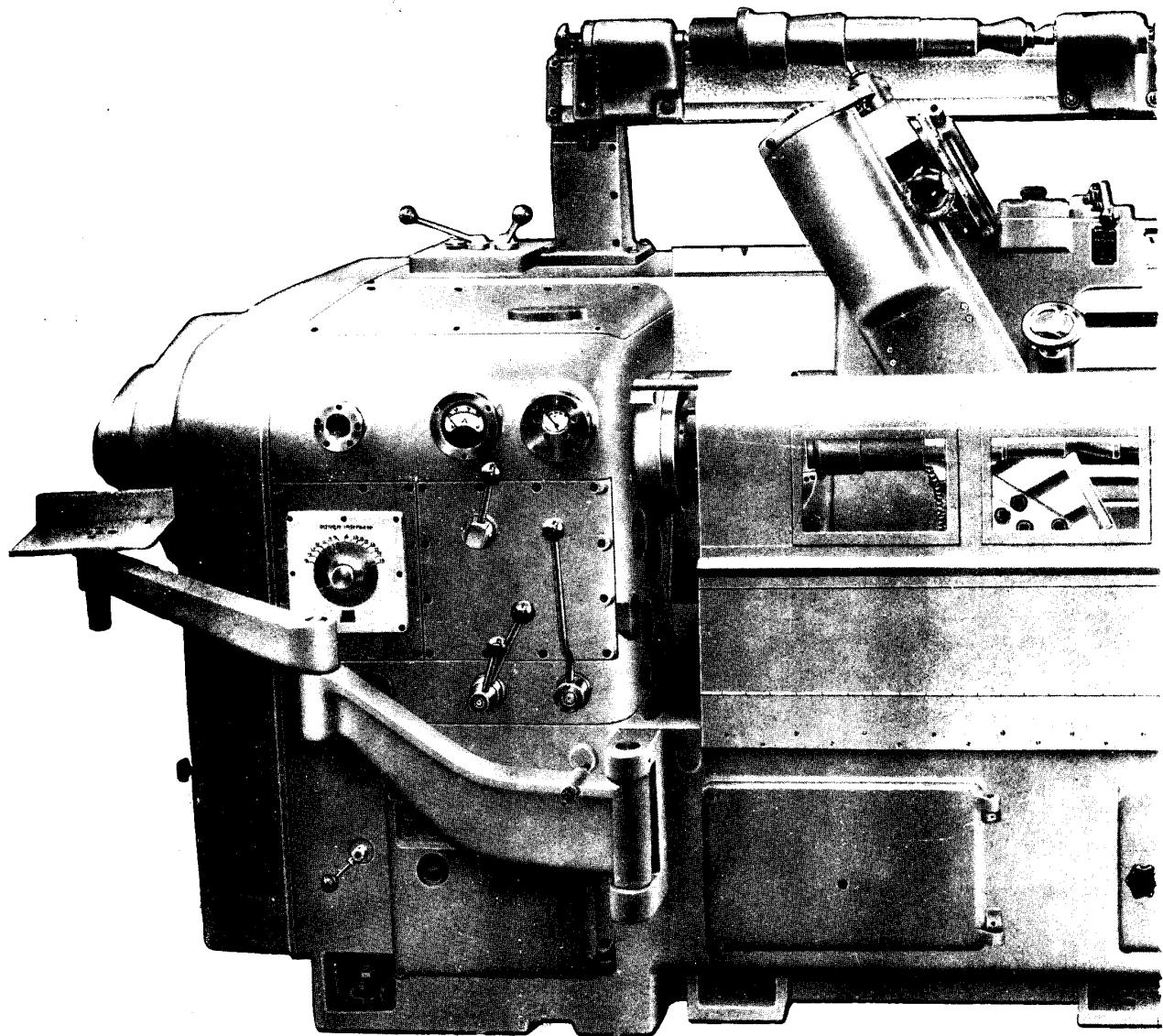


The slide rest guideways are sloped backwards at 15°, and thus the parts located above the centre axis do not interfere when the workpiece is set by means of a crane. Moreover a stock feeding appliance is provided enabling to set even the heaviest workpieces without a crane.

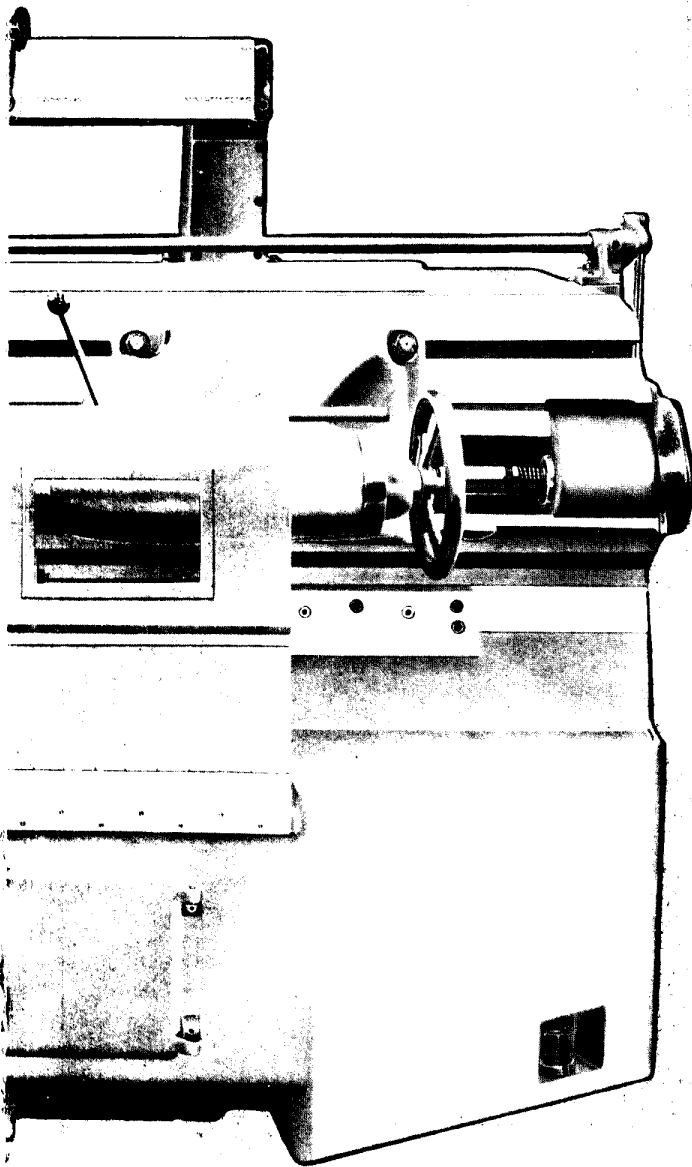
The templet is held in chucks, mounted on the machine bed, in full view of the operator at all times and thus the tracer moving along the profile to be reproduced can be easily watched.

**Templet tracer support**





# TGA-18

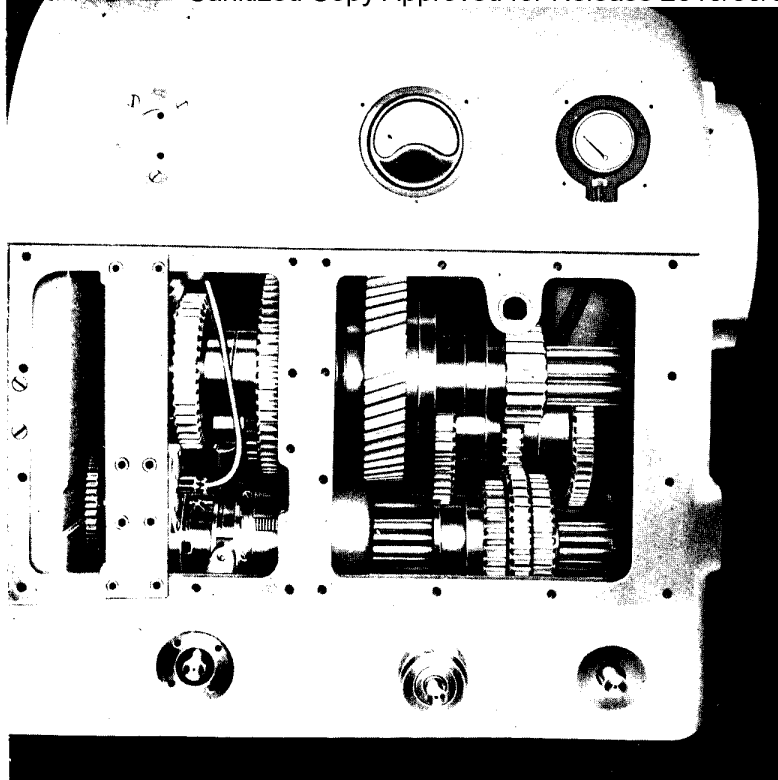


**View of TGA-18  
Copying Lathe  
with chip guard**

Although the chip flow in this machine is extremely smooth, a special guard to protect the operator is provided at the front of the machine and covers the whole turning length. It can be readily unlocked and lowered.

For the purpose of watching the tool while the guard is closed, inspection holes with splinterproof glass are provided in the guard, full safety of the attendant thus being ensured.





Spindle drive

## SPINDLE DRIVE

The drive to the spindle from a 20 kW. (27 H.P.) motor mounted in the machine base is transmitted through V-belts to the headstock in which the multi-plate clutch and brake as well as the twelve-speed gear box are housed. The gears driving the spindle within the highest speed range are helical, quiet and smooth run of the machine thus being ensured.

The spindle speeds can be set within 118 and 1500 r. p. m. in geometrical progression with the exponent 1.25. The front end of the spindle is supported in a double-row roller bearing with an expanding ring for taking up play, while the rear end runs in a single-row roller bearing.

Axial forces are taken up by a self-aligning double-row thrust bearing mounted behind the front bearing. Circulating lubrication from a built-in gear pump is provided for the headstock.

## FEED DRIVE

The slide rest is traversed by the lead screw mounted in a recess of the bed between the guideways. The lead screw is driven from the spindle through V-belts, gear box, the shaft running along the bed, speed reducer and change gears. The gear box provides six feed rates, the three higher being used for roughing, and the three lower for finishing. The feed range, enlarged by change gears, covers feeds from 0.1 to 1.5 mm (0.00393 to 0.0590 in. rev.).

The feed can be actuated only in the direction from tailstock to headstock, while rapid traverse motions are available in both directions, irrespective of the spindle revolving or being at rest.

These motions are driven with a speed of 2.6 m. min. (102 in./min.) from a 0.55 kW. (0.75 H.P.) motor accommodated in the speed reducer box.

Engagement of both the feed and rapid traverse motions in both directions is operated by one lever located on the slide rest at the level of the operator's hand. The feed as well as the traverse motions are disengaged by hand or by means of adjustable stop dogs mounted on the bed.

The work cycle can also be automatic with electro-hydraulic control providing rapid reversal of the slide rest as soon as the tool is withdrawn by the copying attachment.

Apart from power operation the slide rest can be traversed by a hand wheel fitted to it.

The main guideway of the slide rest is hardened and ground. This guideway as well as the lead screw are protected from chips by a telescopic guard which can be retracted under the headstock.



Hydraulic control elements of the slide rest

## COPYING ATTACHMENT

The motions of the cross slide travelling on guideways inclined at an angle of  $60^\circ$  in relation to the spindle axis are controlled by the hydraulic copying attachment permitting for reproduction of shapes inclined up to  $90^\circ$  when increasing diameters are turned, and up to  $30^\circ$  while diameters are diminishing.

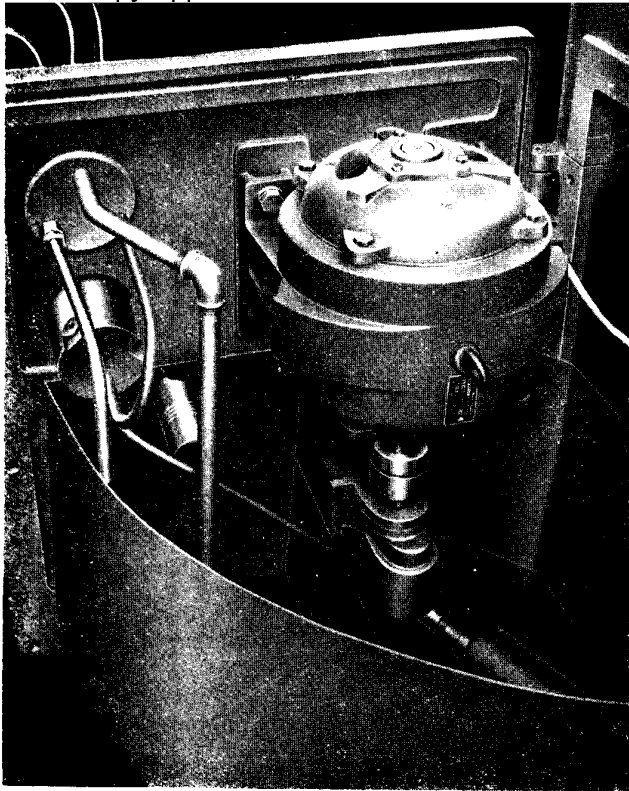
The copying work is done with an accuracy sufficient for grinding operation to follow, and in the case of unground surfaces it may be considered as finishing work. Shapes may be turned to templet regardless of diameter of the workpiece, and cylinders can be turned without templet; thus, when machinery work with ample allowance, both form and cylindrical layers may be cut in repeated operations.

Apart from the copying operation the hydraulic copying attachment provides for rapid approach and withdrawal of the slide rest from the work, operated either by a hand lever or an electromagnet in automatic work cycle.

The principle of copying is based on the work of a differential piston controlled by a tracer.

In spite of the exceedingly simple design and reliability of operation, this arrangement ensures high accuracy and sensitive copying.

The copying attachment is connected by means of a flex to the feeding unit in the machine base.



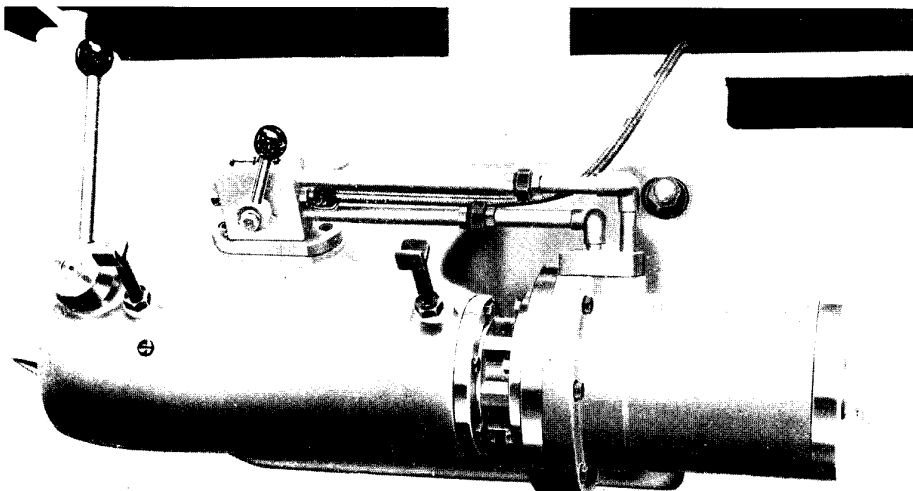
**Hydraulic drive system**

The flexes located at the rear of the machine are not exposed to chips and do not hamper in any way the operator's work. The feeding unit, consisting of a sheet oil tank, electric motor, gear pump and filter, mounted on the hinged cover, is easily accessible as soon as the flexes are unscrewed and the cover opened.

### **TAILSTOCK**

The robust tailstock moves along the bed and can be locked in position with four bolts. The centre is fitted into a small revolving spindle, bearing — mounted in the same way as the main spindle.

The small spindle quill can be protracted by means of a handwheel or a pneumatic cylinder supplied as special equipment.



**Tailstock with  
pneumatic  
adjustment**

# TGA-18

## CHUCKS

The lathe is provided with a hand-operated self-centering three-jaw chuck covering the full range of diameters, as well as with an automatic chuck for the diameters from 40 to 140 mm. ( $1\frac{1}{8}$  to  $5\frac{1}{2}$  in.). A pneumatic chuck covering full range of diameters, with cylinder and pneumatic appliance can be supplied to order at extra charge.

## STANDARD EQUIPMENT

Inserts for the levelling screws, foundation bolts with washers

Automatic chuck covering diameters from 40 to 140 mm. ( $1\frac{1}{8}$  to  $5\frac{1}{2}$  in.)

Self-centering three-jaw chuck covering diameters from 40 to 180 mm. ( $1\frac{1}{8}$  to  $7\frac{1}{8}$  in.)

Spindle centre

Tailstock centre

Set (3 pairs) of change gears for feed box

Set of claws and screw for lifting the machine

Set of spanners

Complete electric equipment, viz:

Main motor 20 kW. (27 H.P.) 1400 r.p.m.

Rapid traverse motor 0.55 kW. (0.75 H.P.) 1400 r.p.m.

Hydraulic pump motor 1.7 kW. (2.3 H.P.) 1400 r.p.m.

Ammeter in the main motor circuit

Micro-switches and electromagnet for automatic cycle control

Complete control appliance

## SPECIAL EQUIPMENT (at extra charge)

Cooling attachment with electric pump 60 ltr. min. (13.2 gal./min.)

Pneumatic attachment for protracting of tailstock quill (instead of the hand wheel)

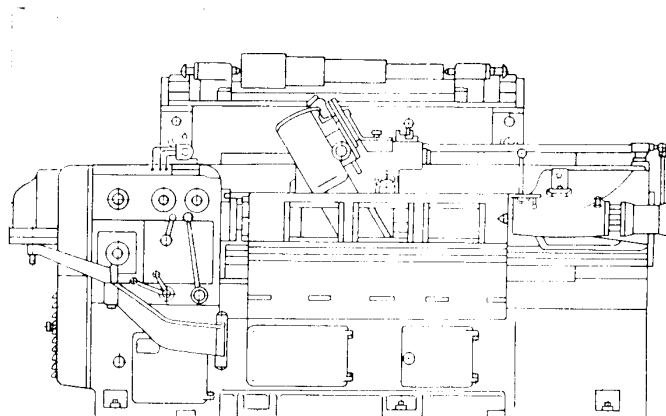
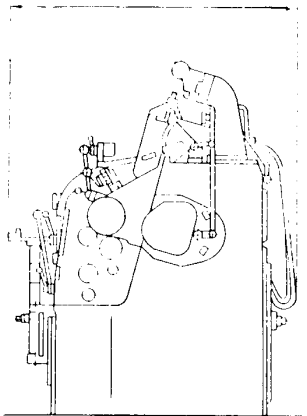
Pneumatic chuck appliance

Pneumatic chuck.

## SPECIFICATION

Max. turning dia.	mm.	180	in.	7 <sup>1</sup> / <sub>2</sub>
Min. turning dia.	mm.	40	in.	1 <sup>7</sup> / <sub>8</sub>
Max. turning length	mm.	1000	in.	39 <sup>3</sup> / <sub>8</sub>
Stroke of copying slide (radial)	mm.	110	in.	4 <sup>3</sup> / <sub>8</sub>
Internal spindle taper	Morse No. 6			
External spindle taper (7:24)	mm.	133	in.	5 <sup>1</sup> / <sub>2</sub>
12 spindle speeds	r. p. m.	118 - 1500		
Number of feeds (with one pair of change gears)		6		
Full range of feeds (with change gears)	mm. rev.	0.1 - 1.5	in. rev.	0.00393 - 0.0590
Speed of rapid travers	mm. min.	2600	in. min.	102
Spindle motor power	kW.	20	H.P.	27
Spindle motor speed	r. p. m.	1400		
Pump motor power	kW.	1.7	H.P.	2.3
Pump motor speed	r. p. m.	1400		
Rapid traverse motor power	kW.	0.55	H.P.	0.75
Rapid traverse motor speed	r. p. m.	1400		
Approx. net weight of the machine	kg.	6000	lbs.	13228
Overall dimensions:	length	mm.	in.	132
	width	mm.	in.	52
	height	mm.	in.	73

English equivalents are approximate only



Subject to minor changes in design

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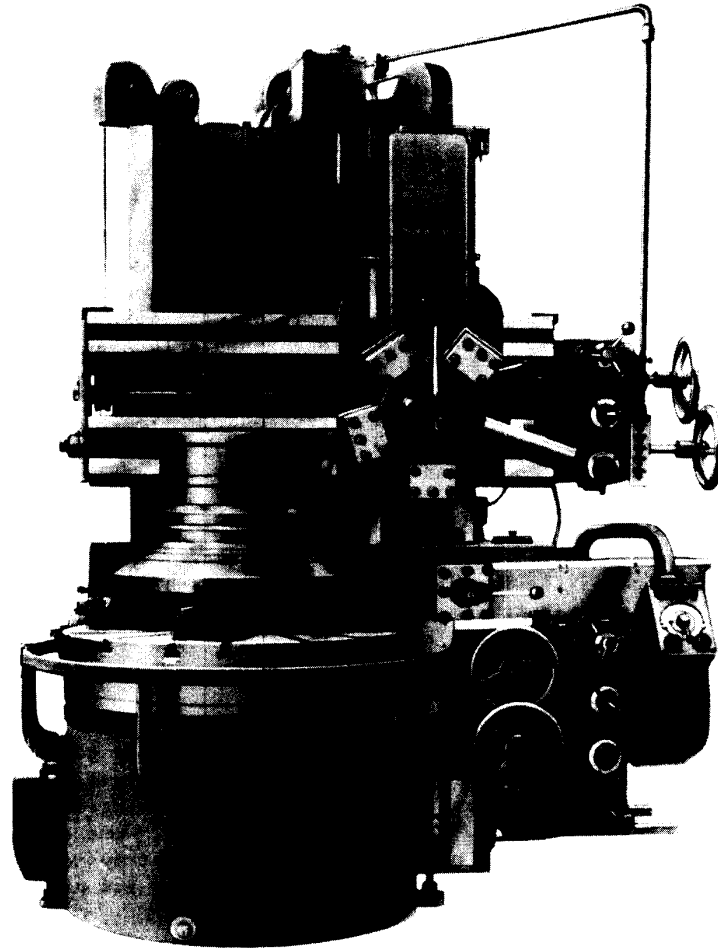
**METALEXPORT**

POLAND, WARSZAWA, P. O. BOX 442

TELEGRAMS: METALEX WARSZAWA

## **SINGLE COLUMN VERTICAL BORING AND TURNING MILL**

### **TYPE KNA-110**



The Single Column Vertical Boring and Turning Mill KNA-110 type is a modern machine-tool fit for up to date production methods. Its rigid design, wide range of speeds and feeds and powerful driving motor ensure a high efficiency of operation effected by means of high-speed steel and tungsten carbide tipped tools. The turret head of the top tool head and the four-tool post of the side tool head afford the possibility of simultaneous work with several tools and of their quick setting anew for the next operation.

Table speeds are electro-hydraulically controlled. They can be set beforehand on the control desk (preselection) during operation. This kind of speed control and the rapid braking of the table by means of an Alnico brake relay are instrumental in substantially curtailing the set-up time. Both tool heads are provided with independent rapid vertical and horizontal travels, this arrangement contributing also to simplicity of operation and reduction of set-up times.

These characteristics as well as other features dealt with in further description of the individual machine units result in great efficiency of the machine, ensure simplicity of attendance and allow machining of workpieces of most intricate shapes.

SOLE EXPORTERS :



**METALEX-EXPORT**

P.O. BOX 442, WARSZAWA, CABLES METALEX - WARSZAWA

**TABLE DRIVE.** The table is driven from an electric motor through Vee-belts, a 16-speed gear box, bevel gears with arc teeth and an oblique tooth gear, which drive the ring gear of the table. The gear box is mounted in the column as an individual unit. Its high grade steel gears are hardened and ground.

The sliding gears of the gear box are electro-hydraulically driven.

All the electric cables and hydraulic pipes run to the gear box which contains the whole of electric and hydraulic appliances. All the gear box shafts run in rolling bearings. The gear box as well as the bed and the table guideways are pressure lubricated by means of a toothed pump driven from an individual motor. Decrease of oil pressure makes starting of the machine impossible or otherwise results in its automatic stopping. It can be detected by means of the signal lamp located on the control desk.

The electric motor is provided with clockwise and counter-clockwise motion and in consequence the table can also rotate in both directions. The Vee-belt drive, bevel gears with arc teeth and oblique toothing of the table ring gear, as well as the precise finish of the gears, afford smooth and even run of the table.

**TABLE.** The table runs on sliding Vee-shaped guideways. This arrangement and the adjustable plain bearings of the spindle ensure precise machining of the workpiece. The adjustable axial rolling bearing of the spindle releases to a certain degree the table guideways. The table Tee-slots serve to fix clamping screws or chucks with clamping jaws.

**CROSS BEAM.** The cross beam slides on the three guideways the column is provided with. The narrow guiding of the middle guideway (with clearance adjustable by means of a tapered ledge) prevents the cross beam from canting. The cross beam can be immobilized in any position by means of clamps. Raising and lowering of the cross beam is effected by means of an individual electric motor through a worm-type speed-reducer and lead screw. Stop dogs limit the maximum travel of the cross beam and protect its driving mechanism from damage.

Horizontal cross beam guideways support the turret tool head. The lead screw, lead shaft and the shaft of the counterbalance slider are accommodated in the cross beam and provided with bearings. The turret tool head feed box is fixed on the right-hand side of the cross beam.

**COLUMN.** The column is rigidly screwed up to the table body. Owing to its dimensions and proper ribbing, the column is remarkable for rigidity. The proper shape of vertical guideways of the column and their careful machining ensure precise guiding of both the cross beam and the turret tool head. The gear box is accommodated in the lower part of the column. The shaft of the bevel gear with arc teeth runs in bearings, it is aligned with the gear box axis. The bevel gear transmits the drive to the table. The upper part of the column comprises the electric control apparatus. The machined upper surface of the column bears the unit driving the cross beam travel and the pulleys of tool head counterbalances, the latter being located inside the column. The rigid design of the column and the accuracy of its guideways provide the possibility of thoroughly precise machining.

**TURRET TOOL HEAD.** The turret tool head comprises three following essential parts:

- 1/ A slide running along the widely spaced cross beam guideways and provided with a toothed segment for turning the tool head.
- 2/ An element rotating on an axle fitted in the slide. This element bears the tool head slider guideways.

KNA-110/2

3/ Tool head slider with a turret head carrying five tool posts. The slide and slider guideways are provided with adjusting ledges which eliminate backlashes in vertical and horizontal travels. These guideways can be hand clamped. By means of hand levers the turret head can be easily set to operation with the next tool.

The tool head is provided with the following vertical and horizontal motions:

- 1/ Feeds (per spindle revolution)
- 2/ Rapid travels
- 3/ Hand travels.

Rapid as well as work travels, both vertical and horizontal, are shown on millimetre scales with verniers, and hand motions - on precision graduated drums of feed box hand wheels. The tool head slide is balanced by a counterbalance. This arrangement affords the possibility to shift the tool head slide easily by hand.

**SIDE TOOL HEAD.** The side tool head is individually driven and motion is independent of that of the turret tool head. Motion ranges of both tool heads are identical. The side tool head consists of:

- 1/ A body sliding along the column guide ways, with the feed box fixed on
- 2/ A rigid slider provided with horizontal radial motion in relation to the table axis.

The slider can be set according to the millimetre scale with vernier or to the precision graduated drum of the hand wheel. Clamping of the slider guideways affords the possibility of thoroughly accurate vertical turning. The side tool head is fitted with a four-tool post, easily shifted and clamped by means of a single lever. Limit stop dogs protect the side tool head against excessive lowering or running into the cross beam.

Power motions of the tool head slider and the tool head along the column are of two kinds:

- 1/ Feeds (in mm per revolution),
- 2/ Rapid travels.

The tool head can also be hand shifted along the column, by means of a hand wheel with a precision graduation plate. The weight of the side tool head is balanced by a counterweight suspended inside the column. The four-tool post of the side tool head is shifted over and fixed by means of a single lever, this arrangement contributing to quick shifting over of tools.

**FEED BOXES.** The feed boxes of both tool heads are normalized. Various feed rates are obtained by switching over the sliding gears on multi-spline shafts running in rolling bearings. The boxes afford 12 various feed rates switched over by means of three levers with a common fulcrum. The direction of the feed is set with a four-position lever, controlling the feed box reversing gear.

Each feed box has two electric motors providing the drive of the independent rapid vertical and horizontal travels. Pressing in of one of the four push-buttons engages the rapid tool head travel in a definite direction.

**CONTROL DESK AND PENDANT STATION.** Table speed control is effected by setting on the control desk the speed required for the next operation. (This can be done with the machine running). Rapid change of the table speed is performed by means of push-buttons accommodated on the pendant station. The lamp located on the control desk signals the deficiencies, if any, of the speed change. Another signal lamp serves to check the right operation of the hydraulic and lubrication appliances.

The arrangement of the desk and pendant station contributes to the simplicity and convenience of attendance and the preselection control reduces once more the set-up time.

KNA-110/3



**THREAD CUTTING AND TAPER TURNING.** Taper turning can be effected with the turret tool head swivelled through the required angle. At Buyer's request, the feed box of the turret tool head can be provided with a set of change wheels for thread cutting fitted with a proper guard. In the side tool head can be fitted with a change wheel box, a set of change wheels for taper turning and appropriate guards. This change wheel box can also be accommodated in the feed box of the turret tool head.

**THE ELECTRIC EQUIPMENT** consists of the following items:

- 1/ Asynchronous squirrel cage three phase electric motors, 3 x 220 V, 3 x 380 V and 3 x 500 V, 50 or 60 Hz according to requirement;
- 2/ Limit switches;
- 3/ Alnico brake relay;
- 4/ Control apparatuses accommodated on a special frame and housed as a complete whole in a recess of the column; control appliances fitted on the control desk and pendant station, as well as in the gear box.

**STANDARD EQUIPMENT.** Following items are supplied with the Single Column Vertical Boring and Turning Mill KNA-110 type:

Turret head,  
Four-tool post of the side tool head,  
Set of spanners and cranks.

**SPECIAL EQUIPMENT.** Upon special request the machine can be equipped with:

Taper turning attachment,  
Thread cutting attachment,  
Clamping jaws with sockets.

## MAIN CHARACTERISTICS

Maximum turning diameter without side tool head	mm	1200	3'11 <sup>1</sup> / <sub>4</sub> "
Maximum turning diameter with side tool head	mm	1100	3' 7 <sup>5</sup> / <sub>16</sub> "
Maximum turning height	mm	950	3' 1 <sup>13</sup> / <sub>32</sub> "
Maximum distance between the side tool head four-tool post and the table axis	mm	570	1'10 <sup>1</sup> / <sub>16</sub> "
Table diameter	mm	1100	3' 7 <sup>5</sup> / <sub>16</sub> "
Number of table speeds		16	
Range of table speeds	r.p.m.	4.5 - 140	
Vertical turret tool head travel	mm	600	1'11 <sup>5</sup> / <sub>8</sub> "
Vertical cross beam travel	mm	800	2' 7 <sup>1</sup> / <sub>2</sub> "
Number of tool holes		5	
Diameter of tool holes	mm	60	2 <sup>23</sup> / <sub>64</sub> "
Number of feeds (both tool heads)		12	
Range of feeds	mm/rev.	0.21-10.0	0.008-0.394 in/rev.
Rapid tool head travels	mm/min.	1800	5'11"/min.
Rapid cross beam travels	mm/min.	500	1'7 <sup>11</sup> / <sub>16</sub> " min.
Swivel of turret tool slide in either direction		45°	
Chip section by cutting speed 12 m/min.(13.1y/min) for steel of tensile strength Rr 50-60 kg/sq.mm	sq.mm	25	0.039 sq.in.
for cast iron	sq.mm	40	0.062 sq.in.
Maximum permissible workpiece weight	kg	3000	59 cwt.
Main motor power		27 HP	
Main motor speed		1500 r.p.m.	
Power of motor for rapid cross beam travel		2.4 HP	
Power of 4 motors for rapid travel of tool heads		0.7 HP each	
Speed of motors for rapid travel of tool heads		3000 r.p.m.	
Approx. weight of the machine	kg	10000	197 cwt.

Subject to minor alterations in design.

KNA-110/4

NWT-124/57